PRIMARY ARITHMETIC

SAMUEL HAMILTON

PRIMARY ARITHMETIC

FOR GRADED SCHOOLS

BY

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PREFACE

THIS Primary Arithmetic is intended to cover the work of the first four years. It is divided into three parts.

Part One includes the work ordinarily done during the *first and second years.*

Part Two includes the work of the *third year.* It is devoted mainly to the presentation of the elementary facts and tables of arithmetic.

The text-book should be placed in the hands of the pupil when he enters upon the work found in Part Two.

Part Three covers the work of the *fourth year.* Its purpose is to give a mastery of the fundamental operations, and, through the study of problems, to develop the ability to use these operations in a practical way.

The aim of this course is twofold: first, to give the child mathematical skill; second, to give him mathematical power.

To these ends attention is invited to the following:

1. The prominence given to drill intended to give skill, and the frequency of systematic reviews.

2. The Study of Problems intended to give mathematical power.

3. The plan which provides an easy treatment of each subject before the complete treatment of it.

4. The easy steps in gradation.

5. The emphasis given to business arithmetic.

6. The appeal made to observation as a stimulus to mathematical thought.

3

In many schools the unit of classification is the half year.
With this in view, the subject matter in the third and fourth
years has been separated into two parts.   The easy treat-
ment of topics covers the first half of the year, and the
more complete treatment the second half.

                                        SAMUEL HAMILTON.

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PART I—FIRST AND SECOND YEARS

PART II—THIRD YEAR

PART III—FOURTH YEAR

PRIMARY ARITHMETIC

PART I—FIRST AND SECOND YEARS

COUNTING NUMBERS TO TEN
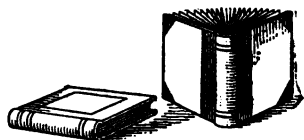
How many books are there in this picture?

Count the caps. How many more caps are there than books?
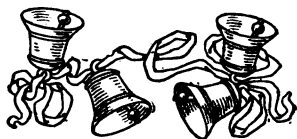
Count the bells. How many are there? Think that you hear them ring 1, 2, 3, 4.

How many ducks do you see in this picture? Tell a story about them.
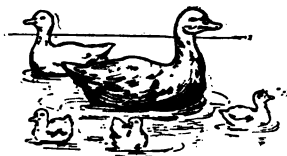
If Rob has as many tops as you see in this picture, how many has he?

One day I saw seven eggs in a nest. How many are there in this one?

Count the apples. How many more apples are there than eggs?
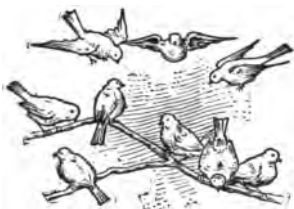
Count the number of birds that you see in this picture.

Here are ten balls. Count these balls.

You have named ten numbers and you can write them either in words or in figures.

naught	one	two	three	four	five	six	seven	eight	nine	ten
0	1	2	3	4	5	6	7	8	9	10
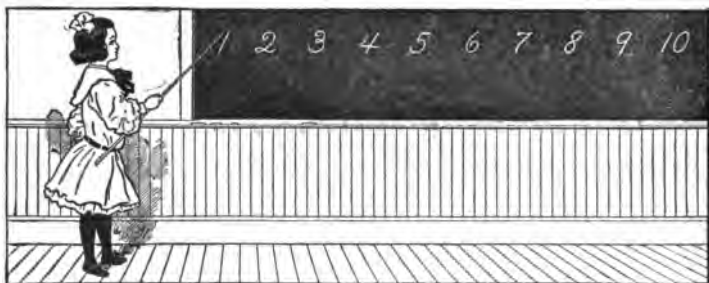
THE NUMBERS TWO AND THREE

$$2 = \begin{matrix} 1 \\ 1 \end{matrix} \qquad 3 = \begin{matrix} 1 \\ 2 \end{matrix} \qquad \text{Three 1's}$$

⊘ and ⊘ are ⊘ ⊘.   ⊘ ⊘ and ⊘ are ⊘ ⊘ ⊘.

1. 1 ball and 1 ball are how many balls?

1 ball + 1 ball = 2 balls.

When you unite 2 and 1 you **add** them and the answer, 3, is called the **sum**.

The sign + is read **and** or **plus**. The sign = is read **equal** or **equals**. $2 + 1 = 3$ is read 2 plus 1 equals 3.

2.
1	1	2	1 top	2 cups	1 car
+2	+1	+1	+2 tops	+1 cup	+2 cars
					Sum

3. John had 3 balls and lost one of them. How many balls had he left?

3 balls − 1 ball = 2 balls.

4. How many more balls are 3 balls than 2 balls?

3 balls less 2 balls = 1 ball.

You have **subtracted** 2 balls from 3 balls. The answer, 1 ball, is the **difference** or **remainder**.

The sign − is read **minus** or **less**. $3 - 2 = 1$ is read 3 minus 2 equals 1.

5. Subtract, beginning at the right:

3	3	3	2	1
1	3	2	1	1

Difference or **remainder**.

THE NUMBER FOUR

$$4 = \begin{array}{ll} 1 \quad 2 & \text{Four 1's} \\ 3 \quad 2 & \text{Two 2's} \end{array}$$

and ➤ ➤ ➤ are ➤ ➤ ➤ ➤

and   are
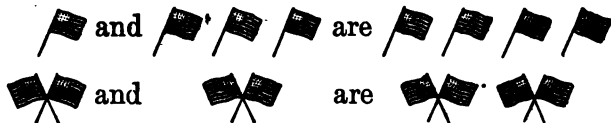
1. Draw flags to show the following :

3 flags + 1 flag = ?   4 flags − 1 flag = ?

2 flags + 2 flags = ?   4 flags − 3 flags = ?

2. Count the flags by 2's. Two 2's = ?

3. How many times must 2 flags be taken to have 4 flags?

4. 2 flags taken two times are —— flags.

5. How many times must 1 flag be taken to have 4 flags. 4 times 1 flag = —— flags.

6. 2×2 flags = —— flags.

The sign $\times$ is read **time** or **times**.

Give answers, reading across the page :

7. 1×1	2×1	1×2	2×2	3×1
8. 1×3	1×4	4×1	$2 + 2$	$3 + 1$
9. $1 + 2$	$4 - 1$	$4 - 2$	$4 - 3$	$1 + 3$

10. 2×2 rings = —— 3×1 box = ——

11. 1×3 balls = —— 2×2 books = ——

12. 4×1 pencil = —— 1×4 tables = ——

PRACTICAL WORK
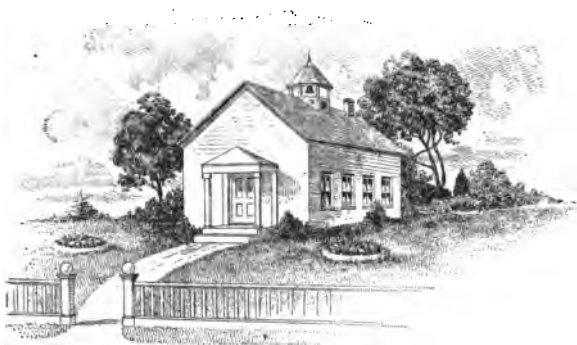
1. Count the windows that you see in the picture.

2. How many panes are there in each window ?

3. Count the large trees on the school grounds.

4. How many flower plots are there ?

5. The porch has —— posts.

6. Count the panels in the door.

7. The glass in each window cost one dollar. How much did all the glass cost ?

8. Mary lives 2 miles from the school. If she should walk to and from the building, how many miles would she walk every day ?

9. James recited twice in the morning and twice in the afternoon. How many times did he recite ?

10. 2 books and 2 books = —— books.

11. 2 times 2 pencils = —— pencils.

12. 4 books less 1 book = —— books.

LIQUID MEASURES.

For this exercise a set of liquid measures should be used.

1. Fill the pint measure with water and empty it into the quart measure. Do this a second time. You have shown that **2 pints equal a quart.**

2. A quart is how many times a pint? A pint is what part of a quart?

3. Show by measuring with the quart measure that **4 quarts equal a gallon.**

4. A gallon is how many times a quart? A quart is what part of a gallon?

5. How many times can the teacher fill Mary's half-pint milk bottle from the pint measure?

6. Clare gets a pint of milk each morning and evening. How many pints does he get in two days?

7. Clare pays 2 cents for a pint of milk. How much does he pay for 2 pints?

8. Raymond delivers, each day, 4 quart bottles of milk. How many gallons does he deliver?

9. Henry goes to the store for 2 quarts of molasses. How many pints does he get?

HALVES, THIRDS, AND FOURTHS

1. Cut an apple into 2 equal parts. What is one part called?

2. Into how many halves can an apple be cut? an orange? a pie?

One half of 1 is written $\frac{1}{2}$.

3. $\frac{1}{2}$ of 2 oranges = — orange; $\frac{1}{2}$ of 4 oranges = — oranges.

4. Cut an apple into 3 equal parts. What is 1 part called?

One third of 1 is written $\frac{1}{3}$.

5. $\frac{1}{3}$ of 3 pennies = ? $\frac{1}{2}$ of 4 splints = ?

6. Cut an apple into 4 equal parts. Each part is named one fourth, or one quarter.

One fourth of 1 is written $\frac{1}{4}$.

7. How many fourths of an apple make a whole apple?

8. Write in figures: one half; one third; one fourth.

9. Find $\frac{1}{2}$ of 4 cents; $\frac{1}{3}$ of 3 cents; $\frac{1}{2}$ of 2 cents.

10. Find $\frac{1}{2}$ of 4; $\frac{1}{3}$ of 3; $\frac{1}{2}$ of 2; $\frac{1}{2}$ of 1; $\frac{1}{4}$ of 4.

11. Draw a circle showing halves; another showing thirds; one showing fourths.

THE NUMBER FIVE

$$5 = \begin{matrix} 1 & 2 \\ 4 & 3 \end{matrix} \quad \text{Five 1's}$$

$$\bigcirc \bigcirc + \bigcirc = 2 + 1 = 3$$
$$\bigcirc + \bigcirc = 1 + 1 = 2$$
$$\bigcirc \bigcirc \bigcirc + \bigcirc \bigcirc = 3 + 2 = 5$$

1. Draw tops to show the following:

   4 tops + 1 top = ?　　　5 tops − 1 top = ?
   3 tops + 2 tops = ?　　　5 tops − 3 tops = ?
   1 top + 4 tops = ?　　　5 tops − 4 tops = ?

2. Count by 1's to 5.　1 in 5, —— times.

3. Give sums.　Make problems:

2	1	3	2	4	1	1	4	2	3
3	4	1	2	1	3	2	0	1	2

4. Subtract.　Make problems:

5	3	5	5	4	5	4	5	2	4
3	1	4	1	3	2	1	5	2	2

5. Give at sight:

   $3 + 2$　　$5 - 4$　　$5 + 5$　　5×1　　$4 + 1$
   $\frac{1}{2}$ of 4　　$\frac{1}{3}$ of 3　　$\frac{1}{4}$ of 4　　$\frac{1}{2}$ of 2　　2×2

6. James spent 2 cents for a cake and 3 cents for an orange.　How many cents did he spend?

7. Mary had 5 chickens.　She gave two to her cousin. How many chickens had she left?

COMPARISON

1. Which line is the shortest? the longest?
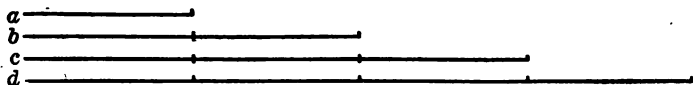
2. Which lines are shorter than *c*?

3. Which line is one half as long as *b*?

4. Which line is one fourth as long as *d*?

5. *A* is how many times as large as *C*?

6. How many times larger than *C* is *B*?

7. Are *A*, *B*, and *C* of the same width? How many square corners has each one?

8. How many sides of *A* have the same length?

9. How many oblongs are there in *B*?

10. How many **equal sides** has this figure? how many square corners?

11. What is the name of the figure? How long is each side?

12. How many inches is it around the square?

13. One inch is what part of two inches?

14. Two inches are what part of 4 inches?

THE NUMBER SIX

$$6 = \begin{matrix} 1 & 2 & 3 \\ 5 & 4 & 3 \end{matrix} \quad \begin{matrix} \text{Six 1's} \\ \text{Three 2's} \\ \text{Two 3's} \end{matrix}$$
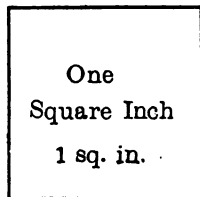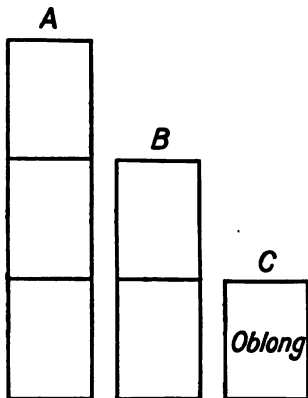
1. Show with marbles the combinations that form 6.

5 marbles + 1 marble = ?   6 marbles − 4 marbles = ?

3 marbles + 3 marbles = ?   6 marbles − 1 marble = ?

2 marbles + 4 marbles = ?   6 marbles − 3 marbles = ?

2. Add:

2	1	2	4	3	5	3	4	0	2
4	5	3	1	3	1	2	2	6	2

3. Fill in the blank spaces:

( )	( )	( )	( )	( )	( )	( )	( )	( )	( )
5	2	4	3	3	3	2	1	6	1
6	5	6	6	5	4	6	6	6	5

4. Subtract:

6	5	6	6	6	4	5	6	6	5
6	2	3	1	5	3	5	2	4	3

5. Place six marbles in two equal groups; in three equal groups.

6. Give answers at sight:

3×2 2×3 6×1 $6 - 4$

$\frac{1}{2}$ of 6 $\frac{1}{3}$ of 3 $\frac{1}{4}$ of 4 $\frac{1}{3}$ of 6

$2 + 2 + 2 = ?$ $3 + 3 = ?$ $1 + 3 + 2 = ?$

$3 + 2 + 1 = ?$ 1 in 6, — times? $3 + 1 + 2 = ?$

THE NUMBER SEVEN

$$7 = \begin{matrix} 1 & 2 & 3 \\ 6 & 5 & 4 \end{matrix} \quad \text{Seven 1's}$$

1. Show with blocks the combinations that form 7.

5 blocks + 2 blocks = ?   7 blocks − 5 blocks = ?
6 blocks + 1 block = ?   7 blocks − 3 blocks = ?
3 blocks + 4 blocks = ?   7 blocks − 2 blocks = ?

2. Add:

2	3	4	5	6	1	2	3	5	2
3	4	3	1	1	6	5	3	2	4

3. From 7 take 3; take 5; 2; 6; 1; 4; 7.

4. 2 in 7, —— times and —— over.
3 in 7, —— times and —— over.
4 in 7, —— time and —— over.
5 in 7, —— time and —— over.

5. Add 3 to 1; to 4; to 2; to 3.

6. Add 2 to 2; to 1; to 5; to 4; to 3.

7. Find:

2 + 3 + 1 = ?   3 + 3 + 1 = ?
3 + 2 + ? = 7   7 − 5 − 1 = ?
4 + 1 + ? = 6   1 + 3 + 2 = ?

8. Name the days of the week. How many are there?

9. Charles had 7 dollars. He gave three dollars to his sister. How many dollars had he left?

THE NUMBER EIGHT.

$8 =$	1	2	3	4	Eight 1's
	7	6	5	4	Four 2's
					Two 4's

1. Illustrate the combinations that make 8.

7 plums + 1 plum = ?   8 plums − 7 plums = ?

5 plums + 3 plums = ?   8 plums − 4 plums = ?

2 plums + 6 plums = ?   8 plums − 6 plums = ?

2. Count to 8 by 2's. $? \times 2 = 8$? $? \times 4 = 8$?

Add up, then down:

3.
4	3	5	2	7	1	6	5	4	6
4	5	2	6	1	7	1	3	3	2

4.
3	4	2	2	1	3	0	1	2	3
2	3	5	3	3	0	2	6	2	1
1	1	1	3	4	5	6	1	4	4

5. Subtract:

8	8	6	8	8	7	8	8	8	8
3	7	3	1	6	5	4	8	5	2

6. In 8 blocks, how many groups of 2's are there?

1 time $2 = ?$ How many groups are there?

2 times $2 = ?$ 2 is contained in 4, —— times.

3 times $2 = ?$ 2 is contained in 6, —— times.

$4 \times 2 = ?$ 2 is contained in 8, —— times.

7. Give answers at sight:

4 + 4	5 + 3	8 ÷ 4	$\frac{1}{2}$ of 8	8 − 5
2 × 4	2 + 6	3 + 5	$\frac{1}{4}$ of 8	8 − 7

DRY MEASURES

PINT   QUART   PECK   BUSHEL
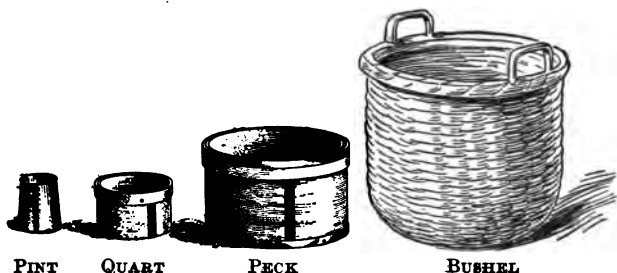
1. Name articles that you can purchase by the peck
or by the bushel.

2. Why are these measures called " dry measures " ?

3. The smallest dry measure shown in the picture
is called a **pint.**   Fill a pint measure with sand and
empty it into the quart measure.   Do this again.   Is
the quart measure now full ?   You have shown that
2 pints equal a quart.

4. What part of a quart is a pint ?

5. Show by measurement, as in example 3, that
8 quarts equal a peck.   A quart is what part of a peck?

6. Show as before that **4 pecks equal a bushel.**   A
peck is what part of a bushel ?

7. A bushel is how many times a peck ?   A peck is
how many times a quart ?

8. Subtract :

8 qt.	7 qt.	8 pk.	6 pt.	8 bu.
4 qt.	3 qt.	3 pk.	4 pt.	5 bu.

THE NUMBER NINE

$9 =$	1	2	3	4	Nine 1's
	8	7	6	5	Three 3's

Add:

1. 4   2   3   7   1   6   5   4   8   3
    5   7   5   2   8   3   4   4   1   6

2. From 9 take 8; take 7; 6; 5; 3; 2; 4; 1; 9.

3. Draw and cut out a 3-inch square.   Place your ruler at the edges and mark the inches.

Fold the paper to show 9 square inches.

How many rows of square inches are there?
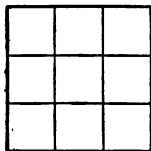
Count the rows of square inches, thus:

  1 time 3 square inches = ? $1 \times 3 = ?$
  2 times 3 square inches = ? $2 \times 3 = ?$
  3 times 3 square inches = ? $3 \times 3 = ?$

4. Find:

$\frac{1}{3}$ of 3 sq. inches. $3 + 6$ $4 \times 2, + 1 = ?$ $3 \times 3 = ?$

$\frac{1}{3}$ of 6 sq. inches. $4 + 5$ $5 + 4 = ?$ $2 + 5 + ? = 9.$

$\frac{1}{3}$ of 9 sq. inches. $6 + 3$ $\frac{1}{3}$ of $9 = ?$ $? + 4 + 4 = 9.$

5. Fill the blank spaces:

( )   ( )   ( )   ( )   ( )   ( )   ( )   ( )   ( )
+3   +2   +4   +6   +5   +5   +7   +4   +8
 9   9   9   9   9   8   9   8   9

6. 9   9   9   9   9   9   9   9   9
   −8   −9   −1   −5   −6   −2   −3   −7   −4

THE NUMBER TEN

10 =	1 2 3 4 5					Ten 1's
	9 . 8 7 6 5					Five 2's
						Two 5's

1. Show with blocks the combinations of 10 :

4 blocks + 6 blocks = ?　　10 blocks − 5 blocks = ?

9 blocks + 1 block = ?　　10 blocks − 8 blocks = ?

3 blocks + 7 blocks = ?　　10 blocks − 6 blocks = ?

2. Count to 10 by 1's; by 2's.

3. Add:

2	4	3	3	9	6	5	1	8	7
8	6	5	7	1	4	5	9	2	3

4. From 10 take 3; take 5; 7; 8; 4; 2; 9; 6; 1.

5. Arrange 10 blocks in two equal groups. How many blocks are there in each group? 2 × 5 blocks = ?

6. Name the piece of money that has the same value as ten pennies. **10 cents equal one dime.**

7. How many nickels equal 1 dime ?

8. Find the cost of 2 oranges at 5 cents each.

9. 2 in 10, — times. 5 in 10, — times.
4 in 10, — times and — over.

10. Take the number in the center from each number outside the circle.
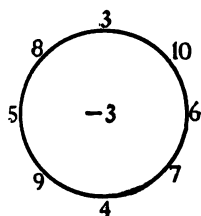
THE NUMBER ELEVEN

$$11 = \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \\ 10 & 9 & 8 & 7 & 6 \end{array} \quad \text{Eleven 1's}$$

1. With squares show the combinations of 11:

4 squares + 7 squares = ?	11 squares − 8 squares = ?
5 squares + 6 squares = ?	11 squares − 4 squares = ?
9 squares + 2 squares = ?	11 squares − 7 squares = ?

2. Add:

2	8	6	7	9	3	10	4	5	1
9	3	5	4	2	8	1	7	6	10

3. Subtract:

11	11	11	11	11	11	9	11	11	11
9	1	3	6	2	5	8	4	8	7

4. Give missing numbers :

$4+4+?=11$	$3+3+3+?=11$	$2\times 5,+?=11$
$5+5+?=11$	$5\times 2,+?=11$	$11-9=?$
$6+3+?=11$	$6\times 1,+?=11$	$11-4=?$

5. 5 dollars + 3 dollars + ? = 11 dollars.

The sign $ may be used for the word dollar or dollars, and the sign ¢ indicates cent or cents. $8 + $3 = ? $5 + $6 = ? $9 + $2 = ? 4¢ + 7¢ = ? 10¢ + 1¢ = ?

6. In 11 there are —— 4's and —— over.

In 11 there are —— 5's and —— over.

In 11 there are —— 3's and —— over.

THE NUMBER TWELVE

12 =	1	2	3	4	5	6	Six 2's	Three 4's
	11	10	9	8	7	6	Four 3's	Two 6's

1. With pencils show the combinations that make the number 12.

8 pencils + 4 pencils = ?	12 pencils − 6 pencils = ?
2 pencils + 10 pencils = ?	12 pencils − 9 pencils = ?
11 pencils + 1 pencil = ?	12 pencils − 4 pencils = ?
9 pencils + 3 pencils = ?	12 pencils − 5 pencils = ?

2. Count to 12 by 1's; by 2's; by 3's; by 4's; by 6's.

3. 12 is how many more than 8? 10? 7? 2? 6? 1? 4? 11? 9? 3? 5?

4. Add:

4	5	10	3	9	7	2	8	6	1
8	7	2	9	3	5	10	4	6	11

5. Subtract:

12	12	12	12	12	12	12	12	12	12
9	8	6	4	2	11	3	5	7	10

6. Find:

4 + 4 + 4	2 × 6	5 + 5 + 2
3 + 3 + 3 + 3	4 × 3	7 + 3 + 1
2 × 5, + 2	3 × 4	2 × 3, + 6
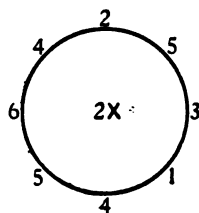
7. Multiply each number outside of the circle by 2.

DOZEN
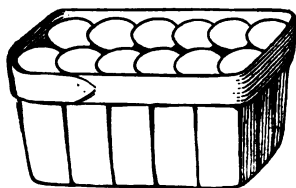
1. Draw 12 lines. Erase $\frac{1}{2}$ of them.   What is $\frac{1}{2}$ of 12 ?

2. Count the eggs that you see in the basket.

3. What name is sometimes given to 12 eggs ? to 12 pins ? to 12 lemons ?

12 things equal one dozen.

4. How many oranges equal $\frac{1}{3}$ of a dozen ?

5. What number is doubled to make 12 ?

6. Make problems with :

4×3 cents	3×4 apples	2×6 games
6×2 horses	5×2 dollars	2×4 cakes
$\frac{1}{2}$ of 12 peaches	$\frac{1}{3}$ of 12 cars	$\frac{1}{4}$ of 12 apples

Subtract at sight :

7.
12	12	12	12	12	12	12	12
3	4	5	6	7	8	9	2

8.
10	10	10	10	10	10	10	10
2	3	4	5	6	·7	8	9

9.
11	11	11	11	11	11	11	11
3	4	5	6	7	8	9	2

10. Make problems with the above numbers.

WRITING AND READING NUMBERS

1. Count thirteen, written 13.

2. Count fourteen, written 14.

3. Count fifteen, written 15.

4. Write sixteen, seventeen, eighteen, nineteen.

The figure **0** is called **naught,** or **zero.** It stands for **nothing.** When placed to the right of 1, the figures stand for *ten ;* when placed to the right of 2, the figures stand for *twenty.*

5. Count twenty-one, written 21; twenty-two, written 22; twenty-five, written 25.

6. Write twenty-six, twenty-seven.

7. Count thirty, written 30; forty, 40; fifty, 50; sixty, 60; seventy, 70; eighty, 80; ninety, 90.

Count ninety-nine, written 99.

8. Make a number board and write numbers to 99 thus:

The first column is made up of the ten digits.

9. Write in figures : Twenty-five, thirty-five, forty-three, seventy- three, sixty-four, eighty- four, fifty-five, seventy-six.

0	10	20	30	40	50	60	70	80	90
1	11	21	31	41	51	61	71	81	91
2	12	22	32	42	52	62	72	82	92
3	13	23	33	43	53	63	73	83	93
4	14	24	34	44	54	64	74	84	94
5	15	25	35	45	55	65	75	85	95
6	16	26	36	46	56	66	76	86	96
7	17	27	37	47	57	67	77	87	97
8	18	28	38	48	58	68	78	88	98
9	19	29	39	49	59	69	79	89	99

Twenty-five cents. Sixty dollars.

Forty-five cents. Seventy-one dollars.

READING NUMBERS

1. Read:

14	24	55	48	51	64	70	91	40
15	34	56	49	56	60	80	90	55
16	44	57	50	59	76	89	99	73

The right-hand figure in a number is called **ones'** figure; the second figure is called **tens'** figure.

Point out the ones and the tens in each of the above numbers; thus, 14 is 1 ten and 4 ones.

TABLE OF COMBINATIONS IN ADDITION

In addition there are 45 different combinations of figures, taken two at a time, and 17 different sums or amounts.   Use these combinations for drill frequently:

1		2		2	3		3	4		3	4	5
1		1		2	1		2	1		3	2	1

4	5	6		4	5	6	7		5	6	7	8
3	2	1		4	3	2	1		4	3	2	1

5	6	7	8	9					6	7	8	9
5	4	3	2	1					5	4	3	2

6	7	8	9			7	8	9		7	8	9
6	5	4	3			6	5	4		7	6	5

8	9		8	9			9					9
7	6		8	7			8					9

ROMAN NUMBERS TO TWENTY

1. The Romans wrote all numbers up to 49 with the use of three letters, I, V, X. I stands for 1; V stands for 5; X stands for 10.
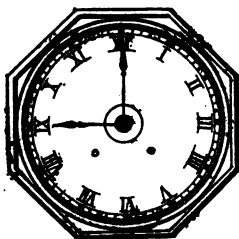
2. This is how the Romans wrote their first twelve numbers:

1	2	3	4	5	6
I	II	III	IV	V	VI
7	8	9	10	11	12
VII	VIII	IX	X	XI	XII

3. Write the first twelve Roman numbers from memory.

4. Read the Roman numbers on the clock face. On clock faces IIII is used for IV.

5. Copy the following numbers:

13	14	15	16	17	18	19	20
XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX

6. Write in Roman numbers, 9. Show what change in the letters will make 11.

7. Write the Roman numbers from 1 to 20.

8. What time is it by the clock in the picture?

The short hand is called the **hour hand**. The long hand is called the **minute hand**.

9. Show the position of the hands at 30 minutes after 9; at 30 minutes after 10; at 30 minutes after 11.

ADDITION

State sums at sight:

	a	b	c	d	e	f	g	h	i	j
1.	2	2	2	2	2	2	2	2	2	2
	76	82	74	62	50	41	53	64	30	72

2. Change the 2 above to 3 and add ; then to 4 :

3.	2	2	2	2	2	2	2	2	2	2
	85	65	75	55	45	63	73	93	43	83

4.	3	3	3	3	4	4	4	4	4	4
	59	49	69	79	49	38	48	88	78	58

5.	2	3	2	4	6	2	5	2	5	2
	4	2	0	3	2	3	2	4	3	5
	3	4	3	1	0	4	1	1	0	3

6. A boy spent 25 cents for a book and 12 cents
for a slate. How much did he spend for both?

	Write *ones* under *ones* and *tens* under
25 cents	*tens*. Add the right-hand column and
12 cents	place the total, 7, underneath. Add the
37 cents	second column and write the total un-
	derneath. The answer is 37 cents.

7. Find the sum of:

25 apples and 63 apples	24 boys and 15 boys
37 cakes and 42 cakes	32 chairs and 26 chairs
81 lemons and 17 lemons	47 books and 22 books
42 balls and 24 balls	36 bats and 52 bats

Add:

	a	*b*	*c*	*d*	*e*	*f*	*g*
1.	20	30	40	50	60	30	50
	30	10	10	20	10	40	30
2.	31	21	23	32	12	30	69
	12	32	13	23	33	13	20
3.	42	44	44	43	14	33	82
	21	23	24	34	44	23	14

Add upward; test by adding downward:

4. $45	$25	$35	$34	$42	$55	$44
$14	$33	$54	$35	$45	$33	$22
5. $16	$45	$67	$72	$81	$83	$59
$31	$54	$21	$25	$12	$15	$20

Only things having **like names** can be added.

	a	*b*	*c*	*d*	*e*
6.	17 boys	36 caps	56 balls	35¢	46 ft.
	12 boys	21 caps	32 balls	24¢	22 ft.

	a	*b*	*c*	*d*
7.	12 girls	34 men	14 tops	15 books
	10 girls	22 men	13 tops	20 books
	23 girls	41 men	21 tops	31 books
8.	14 cars	12 boxes	26 hats	16 days
	32 cars	43 boxes	42 hats	22 days
	22 cars	31 boxes	31 hats	41 days

ADDITION

1. There are 54 houses on one street and 28 on another. How many are there on both streets?

Write *ones* under *ones* and *tens* under

54 houses	*tens*. Add the ones' column. The sum
28 houses	is 12 ones, or 1 ten and 2 ones. Write
82 houses	the 2 under the ones' column and add

the 1 ten to the tens' column. 1 ten + 2

tens + 5 tens = 8 tens. The answer is 82 houses.

Add and test :

	a	b	c	d	e	f	g
2.	36	47	42	54	48	35	64
	25	24	39	36	34	27	28
3.	46	19	29	18	38	17	39
	36	24	10	36	17	46	45
4.	19	21	32	23	31	42	13
	14	19	4	15	43	16	46
	3	12	16	6	8	17	18
5.	11	16	19	41	39	42	15
	31	10	20	23	20	18	41
	29	49	17	18	18	20	38
6.	30	40	32	9	8	15	13
	17	19	30	14	20	20	68
	28	34	9	16	9	38	14

7. Count by 3's to 36 ; to 75. By 4's to 88.

ADDITION

1. Thomas has $24 in the bank and $17 in his pocket. How many dollars has he?

2. A farmer sold 26 bushels of apples on Monday, 35 bushels on Tuesday, and 30 bushels on Wednesday. How many bushels did he sell in the three days?

3. On Tuesday a newsboy sold 28 morning papers and 44 evening papers. How many papers did he sell?

4. A girl had 42 cents left after spending 25 cents for ribbon and 10 cents for pins. How much money had she at first?

5. Mrs. Jackson spent $24 for a suit, $31 for a coat, and $12 for a hat. How much did all cost?

6. Fred planted 29 potatoes in one row, 31 in another, and 33 in a third row. How many potatoes did he plant all together?

7. Ned spent 35¢ for a ball, 25¢ for a bat, and 10¢ for car fare. How much did he spend?

8. The girls spent at the park, 15¢ for ice cream, 20¢ on the roller coaster, 35¢ in the picture gallery, and 12¢ for popcorn. How much did they spend for all?

9. It took Mary 16 minutes to sweep and dust the library, 12 minutes for the dining room, and 21 minutes for the parlor. How long did it take for the three rooms?

10. Edwin has 43 marbles, and Walter has 24 more than Edwin. How many marbles has Walter?

SUBTRACTION

1. Mary has 9 cents. She spends 5 cents. How many cents has she left?

2. A farmer had 7 cows. After selling a number he had 4 left. How many did he sell?

3. Anna had 15 towels to iron. When she had ironed 9, how many were left to iron?

4. Lucy had 12 roses and gave Mary 5 roses. How many roses had Lucy left?

TABLE OF COMBINATIONS IN SUBTRACTION

In subtraction there are 45 different combinations of figures, taken two at a time. Use these combinations for drill frequently:

9	9	9	9	9	9	9	9	9
1	2	3	4	5	6	7	8	9
8	8	8	8	8	8	8	8	7
1	2	3	4	5	6	7	8	1
7	7	7	7	7	7	6	6	6
2	3	4	5	6	7	1	2	3
6	6	6	5	5	5	5	5	4
4	5	6	1	2	3	4	5	1
4	4	4	3	3	3	2	2	1
2	3	4	1	2	3	1	2	1

SUBTRACTION

1. James had 48 cents. He spent 25 cents. How many cents had he then?

48 cents Write *ones* under *ones* and *tens* under
25 cents *tens*. 8 ones − 5 ones = 3 ones. Write the
23 cents three ones in ones' place. 4 tens − 2 tens =
2 tens. The answer is 23 cents.

Test.— 23 + 25 = 48.

Only **like numbers** can be subtracted.

Subtract and test:

	a	b	c	d	e	f	g.
2.	44	38	56	64	49	65	45
	22	13	13	21	23	32	23
3.	58	65	68	57	69	86	77
	33	41	15	24	34	42	33
4.	77	88	75	96	87	94	52
	44	55	25	46	53	41	40
5.	67	59	88	97	76	85	34
	52	45	56	27	36	64	30
6.	99	96	87	79	98	77	59
	38	74	64	38	84	63	50
7.	89	94	59	97	99	89	74
	19	91	18	82	29	78	24

8. Make and solve 50 examples like the above.

PRACTICAL PROBLEMS

1. David is 14 years old and Walter is 7 years younger. How old is Walter?

2. Edna spent 35 cents for butter. She gave the clerk a half-dollar. How much change should she receive?

3. A postal clerk sold 43 postal cards one week, and 67 the next week. How many more did he sell in the second week than in the first week?

4. A man lives 68 miles from the city and has traveled 24 miles toward the city. How many miles has he yet to travel?

5. Tom drove home 78 cows and Ned 56. How many more cows were there in Tom's herd than in Ned's?

6. Edna had 78 pieces in her doll's dinner set, but 36 plates were broken. How many pieces remained?

7. Mr. Wilson's farm contains 76 acres of land, which is 14 acres more than his brother's farm contains. How many acres are there in his brother's farm?

8. William rode 27 miles on his bicycle on Thursday and 14 miles on Friday. How much farther did he ride the first day than the second?

9. Make problems with:

pupils	$	pictures	lamps	books
46 − 14	37 − 24	63 − 12	48 − 36	73 − 21
56 − 43	62 − 31	84 − 21	46 − 24	36 − 15

10. 34 children were invited to Kate's party. How many of them were absent, if only 22 of them attended?

MULTIPLICATION

1. What is the cost of two 2-cent pencils? $2 \times 2 \not\!c = ?$

2. How much should you pay for three 2-cent apples? four 2-cent tops? five 2-cent stamps? six 2-cent papers?

3. James counted $2\not\!c$ seven times; thus, $2\not\!c + 2\not\!c + 2\not\!c + 2\not\!c + 2\not\!c + 2\not\!c + 2\not\!c$, and found that he had $14\not\!c$. He could have said *seven* 2's are 14, or $7 \times 2 = 14$.

4. Write in two other forms: $8 \times 2 = 16$; nine 2's $= 18$; $10 \times 2 = 20$.

5. Build the table of 2's thus:

Write the sum of each column beneath it. Look at each column. See how many 2's it contains. Say, $1 \times 2 = 2$; $2 \times 2 = 4$; $3 \times 2 = 6$; $4 \times 2 = 8$; $5 \times 2 = 10$; $6 \times 2 = 12$; etc.

```
                    2
                  2 2
                2 2 2
              2 2 2 2
            2 2 2 2 2
          2 2 2 2 2 2
          ─ ─ ─ ─ ─ ─
```

6. Find products:

5×2 caps	8×2 plums	9×2 birds	4×2 cups
6×2 dolls	3×2 hats	7×2 birds	2×2 hats

7. Memorize the table.   **Table of 2's**
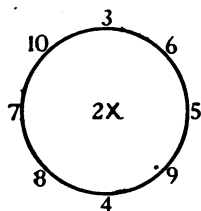
$1 \times 2 = 2$	$6 \times 2 = 12$
$2 \times 2 = 4$	$7 \times 2 = 14$
$3 \times 2 = 6$	$8 \times 2 = 16$
$4 \times 2 = 8$	$9 \times 2 = 18$
$5 \times 2 = 10$	$10 \times 2 = 20$

8. Multiply each number outside the circle by 2.

1. How many are two 7's ? two 10's ?

2. Write these two problems in two other ways.

3. How many are two 34's? This may be written :
   34 + 34 = 68, or 34

                    + 34   The sum of two 34's is 68.

                    68, sum.

4. A shorter process for finding two 34's is by multiplication; written thus, 34   Write the multiplier 2 under the right-hand figure

                          × 2

                          68

of the number to be multiplied, which is 34. Beginning at the right, say 2 × 4 = 8. Write 8 in ones' place in the answer. 2 × 3 = 6. Write 6 in tens' place in the answer. The result is 68. **Test** by addition, 34 + 34 = 68.

Multiply, and test by addition :

	a	b	c	d	e	f
5.	23	54	53	64	71	62
	2	2	2	2	2	2
6.	40	81	94	70	63	53
	2	2	2	2	2	2
7.	93	72	62	53	82	91
	2	2	2	2	2	2
8.	44	32	83	24	84	74
	2	2	2	2	· 2	2

NOTE.—Teachers who desire to proceed from this point with the work of multiplication, will find the tables of 3's, 4's, and 5's on pages 55–60, 69.

DIVIDING BY 2

1. // // // // //   Count the splints by 2's. How many times must two splints be taken to have 10 splints?   10 splints contain 2 splints —— times.

2. 6 contains 2 —— times.   8 contains 2 —— times.   12 contains 2 —— times.

3. Into how many groups of two each may 10 be divided?   10 divided by 2 equals 5, written
10 ÷ 2 = 5, or 2)10.   The sign ÷ is read **divided by.**
              5

Read, and give answers:

4. 4 ÷ 2; 6 ÷ 2; 8 ÷ 2; 10 ÷ 2.

5. 2)8; 2)10; 2)6; 2)12.

6. Divide 24 by 2.

	2 is contained in 2 tens, 1 ten time;
2)24	write 1 in tens' place. 2 is contained in
12	4 ones, 2 times; write 2 in ones' place.
	The answer is 12.

Find the answers:

	a	*b*	*c*	*d*	*e*
7.	2)22	2)24	2)26	2)44	2)20
8.	2)28	2)40	2)48	2)42	2)46
9.	2)62	2)66	2)60	2)64	2)68
10.	2)80	2)84	2)88	2)86	2)82

MAKING CHANGE

Secure toy money, or make circles from cardboard to represent the different pieces.

Appoint storekeepers and purchasers, and have the counting done in the schoolroom. Consult "Market Report" for prices.

1. Hattie's purchase.

Sugar,	10¢
Butter,	15¢
Potatoes,	12¢
Cost,	$\overline{37¢}$

Change $\begin{cases} 1¢ \\ 1¢ \\ 1¢ \\ 10¢ \\ \overline{50¢} \end{cases}$

The storekeeper, when making the change, places the coins as he counts, thus: 38¢, 39¢, 40¢, 50¢.
Change, 13¢.

2. John's purchase.

Fire crackers,	15¢
Torpedoes,	5¢
Matches,	2¢
Rockets,	20¢
Cost,	$\overline{42¢}$

Change $\begin{cases} 1¢ \\ 1¢ \\ 1¢ \\ 5¢ \\ \overline{50¢} \end{cases}$

3. Willie bought meat for 30¢ and milk for 4¢. How much change should he receive from 50¢?

Make change from 50¢ for:

4. Oranges for 15¢, lemons for 8¢, pears for 5¢.

5. Popcorn for 6¢, taffy for 10¢, nuts for 25¢.

6. Rice for 8¢, tapioca for 15¢, prunes for 10¢.

7. Potatoes for 15¢, bread for 8¢, turnips for 12¢.

8. Plums for 20¢, sugar for 10¢, pepper for 8¢.

9. Celery for 7¢, lettuce for 9¢, spinach for 12¢.

10. Corn for 12¢, seed for 25¢, apples for 10¢.

MEASURING LENGTH

For this exercise the teacher should secure a foot rule and a yard stick.

1. Examine a **foot** rule. Observe that it is divided into 12 equal spaces. Each space is called **one inch.** A foot rule is therefore 12 inches long.

2. The following represents a foot rule, although it is only one fourth the real length. Count the number of inch spaces.
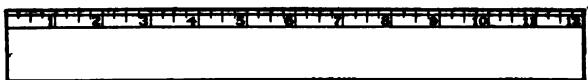
3. Cut from cardboard a foot rule and mark the inches on it.

4. With the rule draw a line 1 inch long ; 4 inches long.

5. How many inches equal $\frac{1}{2}$ of a foot ? $\frac{1}{3}$ of a foot ? $\frac{1}{4}$ of a foot ?

6. Draw an oblong 12 inches long and 8 inches wide. How many inches is it around the oblong ?

7. Draw a 2-inch square. How many inches is it around the square ?

8. Measure a yard stick with your foot rule. This shows that there are **3 feet in a yard.**

9. Mark off with the yard stick on the blackboard a line 1 foot in length ; 2 feet in length ; 1 yard in length.

10. How many feet equal 2 yards ? $\frac{1}{3}$ of a yard ?

REVIEW

1. A man paid $ 80 for 2 cows.   How many dollars did each cost ?

2. A family bought 48 pints of milk in a month. How many quarts did they buy ?

3. How much will 2 lb. of tea cost at 40 ¢ a pound ?

4. How many 2-cent stamps can be bought for 64 cents ?

5. Eva paid 86 cents for 2 yards of linen.   What was the cost of 1 yard ?

6. If Ruth takes 2 piano lessons every week, how many does she take in 44 weeks ?

7. A girl is 14 years old.   Her brother is twice as old.   How old is her brother ?

8. How many pints are there in 44 quarts ?

9. If a clerk earns $ 44 a month, how much will he earn in 2 months ?

10. Dick has 68 cents.   He gives 35 cents to Kate. How many cents has he left ?

11. If molasses costs 14 cents a pint, how much will a quart cost ?

Find the cost of :

12. 2 pieces of soap at 10 cents a piece.

13. 2 pounds of butter at 24 cents a pound.

14. 2 dozen lemons at 12 cents a dozen.

15. 2 yards of muslin at 11 cents a yard.

READING AND WRITING NUMBERS

1. Count to one hundred. One hundred is written 100.

2. Count to one hundred one, written 101.

3. Write in figures: one hundred four; one hundred five; one hundred seven.

4. Read, then write in words: 103, 105, 107, 109.

5. Add 100 to 100. The sum is two hundred, written 200. Add 200 to 100. The sum is three hundred, written 300.

6. Read, then write in words: 400, 500, 601, 700, 802, 900, 501, 404.

Read:

	a	b	c	d	e
7.	109	309	506	836	707
8.	110	310	340	741	888
9.	112	311	765	952	999

The largest number that can be written with three figures is 999. The next number is one thousand, written 1000.

Write in figures:

10. Two thousand.

11. Five thousand.

12. Six thousand.

13. Seven thousand.

14. Eight thousand.

15. Nine thousand.

16. Add 1 to 1000. The sum is one thousand one, written 1001.

Write in figures :

17. One thousand two.   **20.** One thousand seven.

18. One thousand nine.   **21.** One thousand eight.

19. One thousand six.   **22.** One thousand three.

The first figure on the right is called the **ones'** figure ; the next is called the **tens'** figure ; the next is called the **hundreds'** figure ; the next is called the **thousands'** figure.   The **tens** are always read as so many **ones.** Thus, 1625 is read, " 1 thousand, 6 hundred, 25."   In 25, the 2 tens are read as 20.

Read, then write :

	a	*b*	*c*	*d*	*e*
23.	1025	2040	7028	1010	8099
24.	1125	2141	9208	1011	8999
25.	1139	3005	6721	2111	9999
26.	2014	4020	6099	7509	8001

Write as one number :

27. 6 hundreds, 4 tens, 8 ones.

28. 8 thousands, 5 hundreds, 3 tens, 3 ones.

29. 4 thousands, 0 hundreds, 8 tens, 5 ones.

30. 5 thousands, 0 hundreds, 0 tens, 9 ones.

31. 9 thousands, 4 hundreds, 0 tens, 5 ones.

ADDITION

(Review pages 28 to 31)

1. Count from 2 to 100 by 2's.
2. Count from 1 to 101 by 2's.
3. Count from 3 to 102 by 3's.
4. Count from 4 to 100 by 4's.
5. Count from 1 to 101 by 4's.
6. Add the number in the center to each number outside the circle.
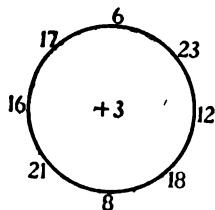
7. Add 3 to each of the following numbers; then 4; then 5:

24	34	44	55	65	75
36	46	56	66	76	86
47	67	27	38	58	78

Find sums.   Test by adding downwards:

	a	b	c	d	e
8.	23	32	42	45	51
	13	23	32	51	42
	43	43	44	54	14
9.	44	21	53	32	31
	55	32	32	24	24
	33	12	43	32	32

The process of uniting two or more numbers to form one number is called **addition**.

The numbers united are called **addends**.

The answer in addition is called the **sum** or **amount**.

ADDITION

1. Add 234, 359, and 266.

$$234 = 2 \text{ hundreds} + 3 \text{ tens} + 4 \text{ ones}$$
$$359 = 3 \text{ hundreds} + 5 \text{ tens} + 9 \text{ ones}$$
$$\underline{266 = 2 \text{ hundreds} + 6 \text{ tens} + 6 \text{ ones}}$$
$$859 = 7 \text{ hundreds} + 14 \text{ tens} + 19 \text{ ones.}$$

19 ones = 1 ten and 9 ones. Write the 9 in ones' place and carry the 1 ten to tens' place. 14 tens + 1 ten = 15 tens. Write the 5 in tens' place and carry the 1 to hundreds' place. 7 hundreds + 1 hundred = 8 hundreds.

Write from dictation, then add and test:

	a	b	c	d	e	f
2.	234	230	101	231	301	243
	326	325	304	405	226	206
	434	265	376	568	304	306
3.	405	304	604	400	291	905
	304	349	787	697	743	634
	296	200	342	345	456	393
4.	623	344	23	509	20	502
	5	593	906	5	102	205
	340	25	25	820	67	50
5.	708	931	68	7	423	791
	55	67	834	751	92	8
	634	8	436	534	899	958

ADDITION

Add rapidly:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*	*n*
1.	5	4	3	2	1	9	8	7	6	5	8	3	2	1
	9	8	6	3	2	0	5	2	7	3	7	5	3	9
	0	1	2	5	6	2	6	7	9	0	3	7	3	0
	1	8	0	4	3	6	1	6	8	3	9	8	0	1
	8	3	6	8	5	6	3	8	4	3	4	6	5	7
	7	6	5	0	5	9	8	1	5	9	6	0	8	6
	2	5	9	9	8	2	7	3	2	9	3	8	9	5
	6	9	3	1	0	4	3	7	1	0	5	9	4	3

Write from dictation, then add:

	a	*b*	*c*	*d*	*e*	*f*	*g*
2.	305	542	740	8	70	79	500
	79	67	90	48	84	342	7
	6	500	708	600	395	9	48
	394	9	502	540	4	805	6
3.	562	807	60	536	28	42	62
	9	58	547	67	906	790	203
	645	6	44	25	627	7	636
	834	526	782	981	8	856	93
4.	390	300	29	6	602	90	67
	59	5	330	306	74	67	500
	508	794	57	27	909	80	395
	74	896	8	407	40	395	70
	380	25	901	92	29	74	5

ADDITION

1. Find the sum of 2430, 4307, and 68.

$2430 = 2$ thousands $+ 4$ hundreds $+ 3$ tens $+ \ 0$ ones
$4307 = 4$ thousands $+ 3$ hundreds $+ 0$ tens $+ \ 7$ ones
$\ \ 68 = 0$ thousands $+ 0$ hundreds $+ 6$ tens $+ \ 8$ ones
$\overline{6805 = 6 \text{ thousands} + 7 \text{ hundreds} + 9 \text{ tens} + 15 \text{ ones.}}$

15 ones $= 1$ ten $+ 5$ ones.   1 ten $+ 9$ tens $= 10$ tens or 1 hundred.   1 hundred $+ 7$ hundreds $= 8$ hundreds. 4 thousands $+ 2$ thousands $= 6$ thousands.

Write from dictation, then add:

	a	b	c	d	e
2.	23	378	298	1008	603
	604	49	342	49	2798
	3068	3067	6781	706	6987
3.	1304	2004	4987	3740	6425
	279	3050	9	609	4020
	6000	50	807	4203	205
	200	674	5002	6001	1347
4.	6870	5475	64	21	3006
	2	2681	370	2102	2904
	3078	5004	4274	3478	799
	2690	79	5007	9	6094

5. $2 + 3 + 7 + 9 + 6 = ?$ 7. $7 + 6 + 5 + 2 + 6 + 7 = ?$

6. $6 + 0 + 7 + 8 + 5 = ?$ 8. $5 + 4 + 3 + 8 + 6 + 9 = ?$

ADDITION

Write from dictation, then add:

1. Twenty-five; two hundred twenty-five; three hundred fifty.

2. Four hundred two; seventy-three; nine; five hundred sixty.

3. Four thousand twenty; six hundred six; five.

4. Six hundred ninety; ten; three hundred; two thousand four.

5. Two hundred eighty; nineteen; six; one thousand.

6. $230 + 65 + 100 + 405.$

7. $300 + 9 + 25 + 500.$

8. $65 \not{c} + 10 \not{c} + 100 \not{c} + 1000 \not{c}.$

9. $\$42 + \$504 + \$105 + \$3.$

10. 24 pt. + 120 pt. + 7 pt. + 36 pt.

11. 1000 qt. + 14 qt. + 135 qt. + 10 qt.

12. 174 pk. + 130 pk. + 5 pk. + 800 pk.

13. 1200 in. + 10 in. + 100 in. + 20 in.

14. 60 dimes + 4000 dimes + 4 dimes + 300 dimes.

15.	16.	17.	18.
2000 hours	1370 minutes	40 gallons	409 days
146 hours	234 minutes	209 gallons	3090 days
9 hours	30 minutes	2900 gallons	9 days
3472 hours	605 minutes	4 gallons	374 days

ADDITION

Read and solve:

1. 2465 + 3642 + 4612 + 5534 + 6342 = ?
2. 4756 + 3254 + 4321 + 4132 + 3536 = ?
3. 4234 + 3512 + 2435 + 1543 + 2453 = ?
4. 5243 + 2453 + 3215 + 4123 + 4231 = ?
5. 6314 + 1355 + 2652 + 1623 + 3245 = ?
6. 7664 + 2845 + 6246 + 3664 + 4554 = ?
7. 6050 + 4004 + 1804 + 4536 + 6143 = ?
8. 3652 + 4630 + 5672 + 3867 + 5468 = ?
9. 4876 + 6724 + 4116 + 3442 + 4162 = ?
10. 3640 + 4466 + 7201 + 404 + 162 = ?

11. A carpenter had 23 men and hired 13 more. How many had he then?

12. Mr. Jones deposited $123 in a bank on Monday; $232 on Tuesday; and $321 on Wednesday. How much did he deposit in the three days?

13. A ship sailed 223 miles the first day, 320 miles the second, and 231 miles the third. How many miles did it sail?

14. A farmer raised 230 bushels of wheat, 122 bushels of corn, 112 bushels of oats, and 323 bushels of rye. How many bushels of grain did he raise?

15. Mrs. Foster bought a bedroom set of furniture for $125, a piano for $350, curtains for $52, pictures for $128, and a rug for $23. How much did they all cost?

SUBTRACTION

(Review pages 32 to 34)

Give differences:

1. $\quad$ 7	6	5	4	13	8	9	11	10
-4	-5	-2	-3	-8	-4	-5	-3	-3
2. $\quad$ 13	6	8	9	7	10	12	11	8
-6	-3	-3	-7	-2	-7	-4	-5	-2
3. $\quad$ 8	9	7	15	5	12	11	17	8
-6	-8	-5	-7	-4	-9	-7	-9	-7
4. $\quad$ 9	13	8	9	10	12	11	12	7
-6	-5	-5	-2	-8	-7	-4	-6	-6
5. $\quad$ 13	14	10	12	9	10	11	12	15
-9	-8	-9	-2	-3	-4	-8	-8	-8
6. $\quad$ 16	15	13	14	15	16	14	12	11
-8	-9	-7	-7	-6	-9	-9	-3	-6

Give answers quickly:

7. $8-3$; $18-3$; $28-3$; $48-3$; $58-3$; $88-3$.

8. $11-4$; $21-4$; $31-4$; $41-4$; $51-4$; $61-4$.

9. $9-5$; $49-5$; $59-5$; $89-5$; $69-5$; $79-5$.

10. $7-6$; $17-6$; $27-6$; $37-6$; $47-6$; $97-6$.

11. $13-7$; $23-7$; $33-7$; $43-7$; $53-7$; $83-7$.

12. $15-8$; $25-8$; $35-8$; $45-8$; $55-8$; $75-8$.

13. $26-9$; $36-9$; $46-9$; $56-9$; $66-9$; $96-9$.

SUBTRACTION

1. From 83 subtract 35.

$83 =$ 8 tens $+$ 3 ones, or 7 tens $+$ 13 ones
$35 =$ 3 tens $+$ 5 ones
$\overline{48 =}$ $\overline{4 \text{ tens} + 8 \text{ ones.}}$

Since 5 ones cannot be taken from 3 ones, take 1 ten
($= 10$ ones) from the 8 tens (leaving 7 tens) and add
it to the 3 ones, making 13 ones. 13 ones less 5 ones
equal 8 ones.   7 tens (remaining) less 3 tens equal 4 tens.

Before subtracting, the work may be expressed thus:
We think: "5 from **13** leaves 8; 3 from 7
leaves 4; 48."

$$\begin{array}{r} 7\ 13 \\ 8\ 3 \\ \underline{3\ 5} \end{array}$$

Test. — $48 + 35 = 83$.

The process of finding the difference between two
numbers is called **subtraction**.

The number from which we subtract is called the
minuend; the number subtracted is called the **subtra-
hend**; the result is called the **difference** or **remainder**.

Subtract, and test each result:

	a	b	c	d	e	f	g
2.	63	92	84	57	84	34	91
	27	69	39	38	49	17	54
3.	48	74	81	63	92	86	84
	29	47	29	44	74	58	45
4.	55	80	31	61	21	34	47
	19	27	18	57	13	16	38

Subtract and test:

	a	b	c	d	e	f
1.	769	819	346	665	749	864
	374	568	94	374	298	539
2.	332	748	552	175	729	534
	140	339	429	68	549	360

3. Make, solve, and test 200 problems like the above.

4. From 803 subtract 576.

7 9 13

$803 = 7$ hundreds $+ 9$ tens $+ 13$ ones
$576 = 5$ hundreds $+ 7$ tens $+ \ \ 6$ ones
$\overline{227 = 2}$ hundreds $+ 2$ tens $+ \ \ 7$ ones.

Take 1 hundred from 8 hundreds; this leaves 7 hundreds. 1 hundred equals 10 tens. Take 1 ten from 10 tens; this leaves 9 tens. 1 ten and 3 ones are 13 ones. 803 then is equal to 7 hundreds, 9 tens, and 13 ones. 13 ones — 6 ones = 7 ones; 9 tens — 7 tens = 2 tens; 7 hundreds — 2 hundreds = 5 hundreds. *Answer*, 227.

Read, then subtract and test:

	a	b	c	d	e
5.	8404	7604	5041	5202	7011
	3625	4896	1979	1824	4583
6.	7024	8401	5401	8704	4087
	3767	4574	2519	6247	1069

7. Subtract 187 from 9234; then take 187 from each successive remainder, until the final remainder is 7364.

SUBTRACTION

1. From 700 take 264.

6 9 10
$700 = 6$ hundreds $+ 9$ tens $+ 10$ ones
$264 = 2$ hundreds $+ 6$ tens $+\ \ 4$ ones
$\overline{436 = 4}$ hundreds $+ 3$ tens $+\ \ 6$ ones

	a	b	c	d	e	f
2.	500	600	900	400	800	700
	154	247	678	197	372	309
3.	300	700	600	800	200	400
	263	288	327	561	181	397
4.	604	809	70]	902	606	705
	160	341	202	720	408	496
5.	609	501	303	806	903	703
	285	209	180	199	287	587
6.	706	801	704	560	601	890
	567	560	395	297	269	798
7.	2042	4106	5001	8012	7020	1407
	1012	2014	3014	5707	2904	1289
8.	7018	5080	9001	8304	4400	1604
	4009	3107	3082	5012	3870	1397

SUBTRACTION

Subtract:

	a	b	c	d	e
1.	6432	7244	6475	7994	8641
	4176	5371	3879	3877	1282
2.	4531	4351	4234	2432	2134
	1522	1543	1235	1344	1545
3.	5423	4215	3254	3524	8231
	2545	1567	1565	1566	4743
4.	4253	3231	5453	8121	6414
	1464	1865	1974	3642	3892

5. 412 boys and 325 girls were enrolled in a school. How many more boys than girls were enrolled?

6. Harry has 42 chickens. After he has fed 15 of them, how many chickens remain to be fed?

7. John's home is 132 miles from New York, and Mary's home is 341 miles from New York. How many miles farther from New York does Mary live than John?

8. The **perimeter** or distance around a dining table is 28 feet and that of the library table is 21 feet. Find the difference in the perimeters.

9. An automobile ran 312 miles one week and 145 miles the next week. How many more miles did the automobile run the first week than the second week?

ADDITION AND SUBTRACTION

1. In the Central School, there are 398 pupils; in the Garfield School, 1045, and in the Holmes School, 2306. How many pupils are there in the three schools?

2. Mr. Adams's home cost $4370, and Mr. Boyd's cost $3745. Find the difference in the cost of their homes.

3. John lives 5906 feet from his school, and Thomas lives 2194 feet nearer the school than John. How far does Thomas live from the school?

4. Bertha counted the people in four parades. In the first there were 208; in the second, 890; in the third, 1506; and in the fourth, 1781. How many were there in all?

5. In two city schools, boys parade as soldiers. In the first school there are 1790 boys; in the second school 279 boys less than in the first. How many boys are there in the second school?

6. A merchant sold for the fourth of July, 3706 small flags, 1712 larger flags, and 19 flags for flag poles. How many flags did he sell?

7. In counting the steps to school, Joseph took 1370, and Harvey took 940 less than Joseph. How many steps did Harvey take?

8. A street-car conductor collected 103 fares on the first trip, 72 on the second trip, 176 on the third trip, and 39 on the fourth trip. How many fares did he collect?

MULTIPLYING BY 3

1. Count by 2's to 36; by 3's to 36.

2. How many are $3+3$, or two 3's? $3+3+3$, or three 3's? $3+3+3+3$, or four 3's?

3. Three 3's are ——; five 3's are ——; six 3's are ——; nine 3's are ——.

4. How many are 7×3? 5×3?

5. Build the table of 3's to 12×3 thus: Write the sum of each column beneath it. Look at each column and say, $1 \times 3 = 3$; $2 \times 3 = 6$; $3 \times 3 = 9$; etc.

```
            3
          3 3
        3 3 3
      3 3 3 3
    3 3 3 3 3
  3 3 3 3 3 3
3 3 3 3 3 3 3
```

6. $3 \times 8 = 8 \times ?$ $3 \times 5 = 5 \times ?$ $9 \times 3 = 3 \times ?$

Table of 3's

7. Memorize the table.

$1 \times 3 = 3$	$7 \times 3 = 21$
$2 \times 3 = 6$	$8 \times 3 = 24$
$3 \times 3 = 9$	$9 \times 3 = 27$
$4 \times 3 = 12$	$10 \times 3 = 30$
$5 \times 3 = 15$	$11 \times 3 = 33$
$6 \times 3 = 18$	$12 \times 3 = 36$

Multiply at sight:

8. Give products.

9.	4	2	5	7	9	8	6	10	11
	3	3	3	3	3	3	3	3	3

10.	12	20	40	30	50	70	60	90	80
	3	3	3	3	3	3	3	3	3

MULTIPLYING BY 3

1. Multiply 65 × 3.

                    3 × 5 ones = 15 ones, **or 1 ten**

Multiplicand   65   and 5 ones. Write the 5 ones in

Multiplier   3   ones' place. 3 × 6 tens = 18 tens;

Product   195   18 tens + the 1 ten of the 15 ones

                    = 19 tens. The answer is 195.

Test. — 65   We think : " 3 times 5 = 15 ; 3 times

         65   6 = 18 ; 18 + 1 = 19." Product 195.

         65   The number multiplied is called the

     195   **multiplicand.** The number showing how

                  many times the multiplicand is taken is

called the **multiplier.** The result in multiplication is
called the **product.**

Multiply, and test each product by addition :

	a	b	c	d	e
2.	45	75	66	74	86
	3	3	3	3	3
3.	135	105	216	308	207
	3	3	3	3	3
4.	236	409	237	258	189
	3	3	3	3	3
5.	209	146	284	167	248
	3	3	3	3	3
6.	132	145	298	276	287
	3	3	3	3	3

MULTIPLICATION OF CONCRETE NUMBERS

Numbers that name objects are **concrete**; as 6 apples, 3 boys, 5 yards.

Numbers that do not name objects are **abstract**; as 7, 9, 3.

In multiplying concrete numbers, the multiplicand and the product have the same name.

The multiplier is always an **abstract** number.

1. How many oranges are there in 3 dozen?

12 oranges in 1 doz.

$\underline{\quad 3 \quad}$ 3 × 12 oranges = 36 oranges.

36 oranges in 3 doz.

Multiply:

	a	b	c	d
2.	46 ¢	24 cans	56 balls	28 qt.
	3	3	3	3
3.	25 ft.	28 pt.	47 gal.	82 yd.
	3	3	3	3
4.	96 da.	84 min.	75 poles	48 miles
	3	3	3	3
5.	93 trees	88 dimes	52 eggs	93 birds
	3	3	3	3
6.	86 wheels	48 cakes	72 pies	197 nuts
	3	3	3	3

MULTIPLYING BY 4

1. Count by 4's to 12; to 24; to 36; to 48.

2. How many are $4 + 4$, or two 4's? $4 + 4 + 4$, or three 4's? $4 + 4 + 4 + 4$, or four 4's?

3. Five 4's are ———; six 4's are ———.

4. How many are 2×4? 4×4? 5×4?

5. Build the table of 4's to 12×4 thus: Write the sum of each column beneath it. Look at each column and say, $1 \times 4 = 4$; $2 \times 4 = 8$; $3 \times 4 = 12$; etc.

```
    4
   4 4
  4 4 4
 4 4 4 4
4 4 4 4 4
4 4 4 4 4 4
─────────────
```

6. $4 \times 8 = ? \times 4$ $9 \times 4 = 4 \times ?$ $6 \times 4 = ? \times 6$.

7. Memorize the table.

Table of 4's
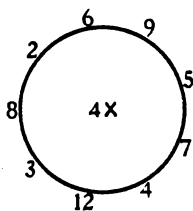
$1 \times 4 = 4$	$7 \times 4 = 28$
$2 \times 4 = 8$	$8 \times 4 = 32$
$3 \times 4 = 12$	$9 \times 4 = 36$
$4 \times 4 = 16$	$10 \times 4 = 40$
$5 \times 4 = 20$	$11 \times 4 = 44$
$6 \times 4 = 24$	$12 \times 4 = 48$

8. Give products.

9. Give products at sight:

3	5	7	9	11	12	4	6	8
4	4	4	4	4	4	4	4	4

10. 4×5 3×8 4×10 4×7 2×9

11. 3×6 4×12 3×2 3×10 4×4

12. 4×11 4×2 3×10 4×9 4×8

PRACTICAL PROBLEMS

1. Emma has 4 pieces of ribbon of 10 yards each. How many yards has she in all?

2. How many lemons are there in 4 dozen?

3. How far can you ride in 4 hours in a carriage that travels on an average of 4 miles an hour?

4. How many pecks are there in 11 bushels?

5. At 10¢ a quart, how much will 1 gal. oil cost?

6. How many days are there in 4 weeks?

Multiply, and test by addition:

	a	b	c	d	e
7.	165	238	369	748	569
	4	4	4	4	4
8.	293	687	574	862	738
	4	4	4	4	4
9.	786	934	867	279	184
	4	4	4	4	4
10.	915	846	739	862	475
	4	4	4	4	4
11.	886	995	774	663	552
	4	4	4	4	4

Give products at sight:

12. 4×20 4×50 4×80 4×25 4×17

13. 4×30 4×60 4×90 4×15 4×18

PRACTICAL PROBLEMS

No.	LAUNDRY PRICE LIST	AMT.
	Shirts, plain . . 10¢	
	Shirts, fancy . . 15¢	
	Collars . . . . 2½¢	
	Cuffs, per pair. . 5¢	
	Socks. . . . . 5¢	
	Handkerchiefs . 3¢	
	Waists . . . . 15¢	
	Wrappers . 25¢ to 75¢	
	Towels . . . . 1¢	
	Sheets . . . . 3¢	
	Pillow slips . 2¢	
	Bolster slips . . 3¢	
	Napkins . . . 1¢	
	Counterpanes . . 10¢	
	Lace curtains . . 25¢	
	Tablecloths. . . 10¢	

Make the required change with toy money, or with paper marked as money. Make other problems from the list.

1. Jane's slip reads: "2 waists, 30¢, 2 collars 5 ." The collector receives from her a half dollar, and in making the change, says "35 cents"; then gives 5 cents, and says, "40 cents"; then gives a dime, and says, "50 cents."

2. Mrs. Brown's slip reads: "1 pair lace curtains 25¢, 2 counterpanes 20¢." How much change should she receive from 50¢?

3. John's slip reads: "1 fancy shirt 15¢, 2 collars 5¢, 2 handkerchiefs 6¢." Make the change from 50¢.

4. Carrie's slip reads: "6 napkins 6¢, 2 tablecloths 20¢, 3 towels 3¢." Return the change from fifty cents.

5. Mother's slip reads: "1 dozen towels 12¢, 9 napkins 9¢, 2 pillow slips 4¢." Find change from 50 cents.

6. Mary's slip reads: "1 wrapper 35¢, 1 waist 15¢." Give the change out of a half dollar.

PRACTICAL PROBLEMS

1. If a sail maker uses 18 yards of cloth in a mainsail, how many yards would he require for 3 such sails?

2. If it takes Helen 24 minutes to hemstitch a collar, how many minutes will it take for 4 collars?

3. A man bought 4 lots at $475 each. How much did they cost?

4. Mr. Horne made 3 payments of $645 each for his house. What was the cost of his house?

5. If each pupil in a school of 658 has 4 books, how many books have they all?

6. A drover bought 3 horses at $235 each. How much did he pay for all?

7. A farmer sold 276 sheep at $4 a head. How much did he receive for all?

8. If a train runs 476 miles in a day, how far can I travel on it in 3 days?

9. A ship sailed 364 miles each day. How far did it sail in 4 days?

10. A car carries 60 persons. How many persons will 4 such cars carry?

11. How many acres are there in 4 farms, if each farm contains 175 acres?

12. At $15 each, how much will 3 paintings cost?

13. How many boys are playing soldier, if there are 4 rows and 16 boys in each row?

DIVIDING BY 3

1. Count by 3's to 9; to 18; to 30; to 36.

2. How many times does 6 contain 3? ||| |||

3. Show by separating into groups:

12 contains 3 ——— times   15 contains 3 ——— times
18 contains 3 ——— times   21 contains 3 ——— times

4. Give quotients at sight:

$9 \div 3$ $18 \div 3$ $33 \div 3$ $12 \div 3$ $27 \div 3$
$24 \div 3$ $30 \div 3$ $21 \div 3$ $36 \div 3$ $15 \div 3$
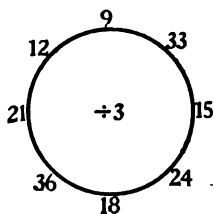
5. Divide each number outside the circle by 3.

6. Find:

$\frac{1}{3}$ of 27 $\frac{1}{3}$ of 30 $\frac{1}{3}$ of 36 $\frac{1}{3}$ of 15
$\frac{1}{3}$ of 12 $\frac{1}{3}$ of 18 $\frac{1}{3}$ of 21 $\frac{1}{3}$ of 33

7. Compare 6 and 2; thus: 6 is 3 times 2.   2 is $\frac{1}{3}$ of 6.

The number divided is called the **dividend.**
The number by which we divide is called the **divisor.**
The answer in division is called the **quotient.**

Divide and test:

	a	*b*	*c*	*d*	*e*
8.	3)24	3)36	3)27	3)30	3)21
9.	3)393	3)363	3)339	3)933	3)303
10.	3)150	3)900	3)660	3)693	3)369

1. The sign ÷ is read **divided by.**

2. $24¢ ÷ 3¢$ means that we are to find *how many times* $3¢$ is contained in $24¢$; thus: $3¢)\overline{24¢}$

                                                 8 times.

Find quotients:

3. 82 days ÷ 2 days

4. 186 hours ÷ 3 hours

5. 422 minutes ÷ 2 minutes

6. 448 feet ÷ 2 feet

7. 249 inches ÷ 3 inches

8. 622 dollars ÷ 2 dollars

9. 189 years ÷ 3 years

10. 244 roses ÷ 2 roses

11. 664 cents ÷ 2 cents

12. 336 quarts ÷ 3 quarts

13. 144 gallons ÷ 2 gallons

14. 428 pints ÷ 2 pints

15. $24¢ ÷ 3$ means that we are to find *one third* of $24¢$; thus: $\frac{1}{3}$ of $24¢$ equals $8¢$, or $3)\overline{24¢}$.

                                                    8¢

Find quotients:

16. 224 days ÷ 2

17. 333 cents ÷ 3

18. 216 dollars ÷ 3

19. 622 birds ÷ 2

20. 326 inches ÷ 2

21. 219 hours ÷ 3

22. 444 roses ÷ 2

23. 468 minutes ÷ 2

24. 844 gallons ÷ 2

25. 646 quarts ÷ 2

26. 969 pencils ÷ 3

27. 842 books ÷ 2

28. 936 hours ÷ 3

29. 288 pages ÷ 2

30. 428 pints ÷ 2

31. 639 pens ÷ 3

REMAINDER IN DIVISION

1. Divide 263 by 3.

Divisor 3)263 Dividend   26 tens + 3 = 8 tens, and 2 tens
    87 Quotient   (20 ones) remaining.   Write
    Remainder 2   the 8 tens in the tens' place.
20 ones + 3 ones = 23 ones.   23 ones + 3 = 7 ones, and
2 ones remaining.   Quotient 87; remainder 2.

We think: "3 in 26, 8 times, and 2 remaining; 3 in 23,
7 times, and 2 remaining."   Quotient 87; remainder 2.

Test. — If the answer is correct, then 3 × 87, or 261,
+ 2, the remainder, will equal 263, the dividend.

Divide and test by 2; by 3:

	a	b	c	d	e
2.	265	864	786	624	7368
3.	713	219	265	758	2457

4. Compare $12 \div 2$ and $\frac{1}{2}$ of 12; $12 \div 3$ and $\frac{1}{3}$ of 12.

To find $\frac{1}{2}$ of any number, divide the number by 2.
To find $\frac{1}{3}$ of any number, divide the number by 3.

How many are:

	a	b	c
5.	$\frac{1}{3}$ of 240 men ?	$\frac{1}{3}$ of 171 balls ?	$\frac{1}{2}$ of \$7484 ?
6.	$\frac{1}{3}$ of 717 feet ?	$\frac{1}{2}$ of 216 mi. ?	$\frac{1}{3}$ of \$3927 ?
7.	$\frac{1}{3}$ of 435 yd. ?	$\frac{1}{3}$ of 384 bu. ?	$\frac{1}{2}$ of \$8064 ?
8.	$\frac{1}{3}$ of 759 gal. ?	$\frac{1}{2}$ of 902 in. ?	$\frac{1}{3}$ of \$2160 ?
9.	$\frac{1}{3}$ of 285 pk. ?	$\frac{1}{3}$ of 405 ft. ?	$\frac{1}{2}$ of \$2754 ?

DIVIDING BY 4

1. How many are four 2's?   4 in 8, —— times.

2. How many are four 3's?   4 in 12, —— times.

3. How many times does 16 contain 4?

4. 20 contains 4, —— times; 24 contains 4, —— times; 28 contains 4, —— times; 32 contains 4, —— times.

5. $36 \div 4 = ?$ $40 \div 4 = ?$ $44 \div 4 = ?$ $48 \div 4 = ?$
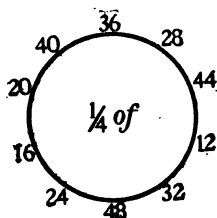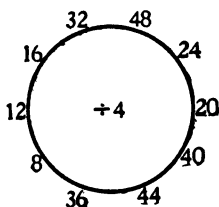
6. Give quotients.   7. Give parts.

Divide, and test by multiplication:

	a	*b*	*c*	*d*	*e*
8.	4)268	4)864	4)936	4)468	4)2240
9.	4)3604	4)9216	4)3704	4)4008	4)3246
10.	4)4693	4)5248	4)9270	4)7354	4)4687
11.	4)5169	4)2834	4)6573	4)6291	4)8473
12.	4)6981	4)1243	4)6476	4)5034	4)2075
13.	4)3204	4)4126	4)3958	4)2976	4)8169

DIVISION

1. Walter had 48 baskets of fruit. He sold an equal number to 4 different buyers. How many baskets did each buy?

4)48 No. of baskets.   ¼ of 48 baskets = 12 baskets.
  12 No. of baskets to each.

2. Mary has 45 cents. How many 3 cent oranges can she buy with her money?

3¢ = cost of 1 orange   3¢)45¢
                         15 times, or 15 oranges.

3. A man divided property valued at $369 equally among his 3 children. How much did each receive?

4. Mr. Bell earned $396 in 3 months. What were his monthly wages?

5. Find the cost of 1 bushel of wheat, if 4 bushels cost 280 cents.

6. If a girl sews 4 buttons on each pair of gloves, how many pairs has she finished when she has used 468 buttons?

7. A farmer having 96 hogs sold one third of them. How many did he sell?

8. In a car containing 639 baskets of peaches, one third were spoiled. How many baskets were spoiled?

9. How many pound boxes can be filled from 164 quarter pounds of candy?

10. When molding costs 15¢ a yard, how much will 1 foot of it cost?

1 ft. = ⅓ of a yard; 1 ft. will cost ⅓ of 15¢, or **5** cents.

UNITED STATES MONEY

United States money is written in **dollars** and **cents**.

A period (.), named a "**decimal point**," is placed to the right of dollars. After the point, cents are written in two places. Thus, 5 dollars and 25 cents is written $5.25.

  1. Read: $8.40; $9.67; $3.14; $8.24; $7.05.

In addition and subtraction of United States money, *the point* must be written *under the point*, dollars under dollars, and cents under cents.

Read and add :

2. $3.45	$2.24	$3.14	$3.62	$2.43
2.61	3.36	1.35	2.45	3.25

Add across and in columns :

3. $2.24 + $3.25 + $6.42 + $2.56 + $3.25 + $4.63 =

4. $3.14 + $2.35 + $3.11 + $6.14 + $2.65 + $6.15 =

5. $4.24 + $5.32 + $2.34 + $5.23 + $2.34 + $5.26 =

Read and find differences :

	a	b	c	d	e
6.	$3.46	$3.25	$3.41	$6.11	$5.13
	1.25	2.74	2.56	2.65	2.65
7.	$2.43	$3.25	$3.41	$6.11	$5.13
	1.47	1.46	2.16	5.26	2.56

8. Add $4.25 and $2.64.   **10.** Add $2.54 and $1.36.

9. Add $3.62 and $2.16.   **11.** Add $3.26 and $1.56.

UNITED STATES MONEY

Read and add:

	a	b	c	d
1.	$246.25	$632.75	$327.56	$805.96
	318.75	738.49	928.89	613.73
	92.48	·918.86	738.86	928.45
	18.64	29.94	198.37	56.91
	237.75	169.83	75.59	219.87
2.	$178.84	$219.35	$165.27	$214.56
	6.92	7.29	86.15	3.94
	175.49	216.87	283.85	69.47
	862.81	938.75	395.94	138.85
	219.97	139.49	415.86	475.27

3. $465.75 + $37.28 + $692.37 + $475.84 = ?

4. $193.85 + $87.96 + $375.84 + $215.79 = ?

5. $276.49 + $29.49 + $ 49.86 + $936.93 = ?

6. $475.98 + $18.07 + $126.92 + $214.85 = ?

       +   +   +   = ?

Subtract and test:

	a	b	c	d
7.	$475.36	$435.24	$438.64	$821.42
	196.28	178.95	195.73	195.38
8.	$317.61	$124.15	$326.47	$412.49
	219.84	95.76	158.96	273.89

9. $246.37 − $174.75   10. $235.55 − $169.73

MULTIPLYING BY 5

1. Count by 5's to 10; to 30; to 45; **to 60.**

2. How much are two 5-cent pieces ? $2 \times 5 = ?$

3. How much are three 5-cent pieces ? $3 \times 5 = ?$

4. Tell the value of four 5-cent pieces; of 5 such pieces; of 6, 7, 8, 9, 10, 11, 12.

5. How many 5's are there in 10 ? in 20 ? in 30 ? 60 ? 25 ? 35 ? 45 ? 55 ? 40 ? 50 ? 15 ?

6. Multiply each of the outside numbers by 5. Change the number within the circle to 4 and multiply; then to 3; to 2. Build the table of 5's as you built the table of 4's.
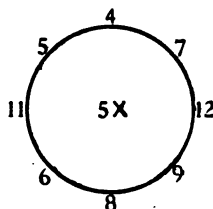
7. Memorize the table.

8. Supply the missing numbers :

Table of 5's

$1 \times 5 = 5$	$7 \times 5 = 35$
$2 \times 5 = 10$	$8 \times 5 = 40$
$3 \times 5 = 15$	$9 \times 5 = 45$
$4 \times 5 = 20$	$10 \times 5 = 50$
$5 \times 5 = 25$	$11 \times 5 = 55$
$6 \times 5 = 30$	$12 \times 5 = 60$

$2 \times 5 = ?$ 5 is ? of 10
$4 \times ? = 20$? is $\frac{1}{5}$ of 20
$5 \times 5 = ?$ 25 is ? $\times$ 5
$? \times 5 = 35$? is $\frac{1}{5}$ of 35
$9 \times ? = 45$ $\frac{1}{5}$ of 45 is ?

9. Give products : 8×5 ; 9×5 ; 3×5 ; 5×5 ; 7×5 ; 6×5 ; 12×5.

10. What is the difference in value between :
$3 \times \$5$ and $5 \times \$3$? 7×5 hats and 5×7 hats?
$6 \times \$5$ and $5 \times \$6$? 2×4 books and 4×2 books?

MULTIPLICATION OF DOLLARS AND CENTS

1. Multiply $ 3.65 by 3.

$ 3.65
　　3
———————
$ 10.95

In multiplying dollars and cents, place the decimal point in the product directly under the decimal point in the multiplicand. Write the dollar sign before the number of dollars. •

2. Multiply $ 0.65 by 4.

$ 0.65
　　4
———————
$ 2.60

3. Multiply 70¢ by 3.

70¢
　3
———————
210¢ = $ 2.10 (Why ?)

Multiply:

	a	b	c	d
4.	$ 3.50 2	$ 3.05 4	$ 6.05 3	$ 9.40 5
5.	$ 7.04 4	$ 0.60 5	$ 0.08 3	74¢ 4
6.	22¢ 3	49¢ 5	26¢ 4	95¢ 5

7. How much will 3 pecks of peaches cost at 65¢ a peck ?

8. A messenger boy delivers 4 messages at 45¢ each. How much does he earn for his company ?

9. May gets $ 3.75 per week in a department store. Find her wages for 4 weeks.

PRACTICAL PROBLEMS

1. How many seats are there on each side of the car?

2. How many are two times 11 seats?

3. The conductor collected 75 fares on the first trip and 87 fares on the return trip. How many fares did he collect?

4. The fare is 5 cents. How much money did he collect on both trips?

5. A lady paid for herself and 5 children. She gave the conductor a half dollar. How much change should she receive?

6. Each seat will accommodate two persons. How many persons can be seated in the car?

7. The conductor earns $2.50 in a day. How much does he earn in 5 days?

8. The motorman is paid $2.75 a day. How much does he earn in 5 days? How much more does he earn in a day than the conductor?

9. The line is 8 miles long. How far does a car run in making 5 round trips?

10. On one trip each seat was occupied, and 5 persons had to stand. Find the amount of the fares for the trip.
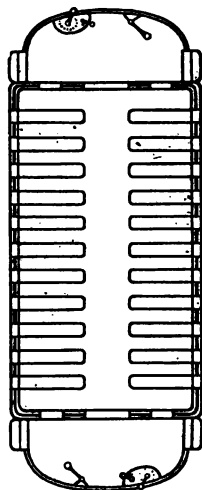
MULTIPLYING BY 6

1. Count by 6's to 12; to 24; to 48; to 60; to 72. Build the table of 6's.

2. How many 6's are there in 12? in 18? 24? 36? 48? 54? 60? 66? 72?

Table of 6's

$1 \times 6 = 6$	$7 \times 6 = 42$
$2 \times 6 = 12$	$8 \times 6 = 48$
$3 \times 6 = 18$	$9 \times 6 = 54$
$4 \times 6 = 24$	$10 \times 6 = 60$
$5 \times 6 = 30$	$11 \times 6 = 66$
$6 \times 6 = 36$	$12 \times 6 = 72$

3. Memorize the table.

4. Compare in two ways: Thus 6 is 3 more than 3; 6 is 2×3.

6 and 3	12 and 3
6 and 4	12 and 4
6 and 5	12 and 5
4 and 2	16 and 4

5. Multiply each number outside the circle first by 3, then by 4, then by 5, then by 6.
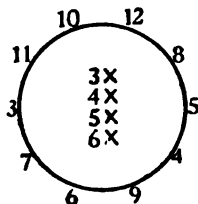
Multiply by 6; by 5; by 4; by 3:

	a	b	c	d	e
6.	243	567	149	759	894
7.	679	295	293	384	679
8.	978	869	687	825	856
9.	207	890	903	708	605

10. Give products at sight:

6×40	5×20	6×80	5×50	6×61
6×70	5×35	5×32	6×25	6×42
6×90	5×41	4×71	4×92	6×81

DIVIDING BY 5

1. Count by 5's to 15; to 25; to 45; to 50; to 60.

2. $? \times 5 = 15$ $? \times 5 = 20$ $? \times 5 = 40$

3. Give answers:

$5 \div 5$	$15 \div 5$	$50 \div 5$	$45 \div 5$
$30 \div 5$	$40 \div 5$	$35 \div 5$	$10 \div 5$
$55 \div 5$	$60 \div 5$	$25 \div 5$	$20 \div 5$
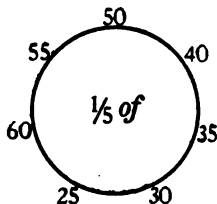
Division may be indicated in *three ways:* First, $8 \div 2$; second, $2)\overline{8}$; third, $\frac{8}{2}$. Each is read 8 *divided by* 2.

4. Read and solve:

$16 \div 4$ $4)\overline{16}$ $\frac{16}{4}$ $\frac{25}{5}$ $\frac{64}{4}$ $\frac{36}{3}$ $\frac{52}{4}$

$\frac{39}{3}$ $\frac{55}{5}$ $\frac{125}{5}$ $\frac{324}{4}$ $\frac{340}{5}$ $\frac{284}{4}$ $\frac{345}{5}$

5. Divide by 5 and give remainders:

43   62   27   48   39   56   53   **14**   27

6. Find $\frac{1}{5}$ of:

420 men	375 hr.	825 pt.	\$ 415	870¢
365 horses	180 da.	315 gal.	\$ 630	560¢

Divide and test:

	a	*b*	*c*	*d*	*e*
7.	$5)\overline{4225}$	$5)\overline{7086}$	$5)\overline{9275}$	$5)\overline{4376}$	$5)\overline{8450}$
8.	$5)\overline{5693}$	$5)\overline{4287}$	$5)\overline{1364}$	$5)\overline{7006}$	$5)\overline{7005}$
9.	$5)\overline{7024}$	$5)\overline{9046}$	$4)\overline{2753}$	$5)\overline{4203}$	$5)\overline{2004}$

DIVIDING BY 6

1. How many times is 6 contained in 12? in 18? in 24? in 48? 60? 54? 36? 66? 42? 72?

2. Give answers:

$42 \div 6$	$60 \div 6$	$36 \div 6$	$24 \div 6$	$48 \div 6$
$35 \div 5$	$48 \div 4$	$\frac{1}{5}$ of 35	$\frac{1}{6}$ of 42	$60 \div 6$
6)48	6)60	6)54	6)36	6)30

3. Divide each number by 6:

480	600	624	540	366
720	618	246	726	612

4. Complete:

$15 \div 6 =$ — and — over. $6 \times 8, + ? = 50$ $6 \times 9, + ? = 59$

$45 \div 6 =$ — and — over. $? \times 6, + 2 = 56$ $6 \times ?, + 3 = 45$

5. Divide by 5 and give remainders; then by 6:

843	864	631	7235	8697
675	293	845	4618	3256
931	787	569	8627	4367

6. Compare in two ways: $18 and $3; $36 and $6; 35 books and 5 books; 24 hats and 4 hats; 42 lemons and 7 lemons; 45¢ and 5¢.

7. Find the cost of:

6 oranges at 18¢ a doz.   40 pears at 4¢ each.

36 apples at 2¢ each.   18 eggs at 10¢ a doz.

8. At 3¢ apiece, how many oranges can you buy for 18¢? for 42¢? for 36¢? for 72¢?

PRACTICAL PROBLEMS

1. Find the cost of 5 yards of cloth at $ .75 a yard.

2. Four boys deposited in the school bank as follows: $ 4.25, $ 6.93, $ 4.34, and $ 6.05. What was the entire deposit?

3. Julia went to the store with a twenty-dollar bill. She paid 75 cents a yard for 6 yards of oilcloth, and $ 9.50 for a rug. How much had she left?

4. A box contains 360 oranges. If $\frac{1}{8}$ of them are bad, how many good ones are there in the box?

5. At 36 cents a dozen, how much will 5 dozen oranges cost?

6. At 24 cents a dozen, how much will 6 dozen oranges cost? How much change should a lady receive after paying for the oranges with a two-dollar bill?

7. Make a problem with: $ 8.25, $ 6.32, $ 6.56, and $ 5.

8. John paid a bill of $ 7.32 and had $ 6.54 remaining. How much had he at first?

9. If there are 28 lines on each page of a book, how many lines are there on 9 pages?

10. A furniture dealer paid $ 624 for tables at $ 6 each. How many did he buy?

11. Jack has collected 250 post cards and pastes 5 on each page of his album. How many pages do they fill?

12. How many lamps, at $ 5 each, can be bought for $ 83? How much money will remain?

DRILLS IN ADDITION

Add rapidly, finding 3 answers in 1 minute.

	a	b	c	d	e
1.	2345	3256	3556	4325	2546
	3253	5433	5234	2534	3452
	1432	2345	3245	3523	2543
	2564	4356	5243	2456	3245
	7316	5134	2356	5346	1236
2.	2434	3245	2546	6513	5342
	3256	1452	4532	3245	4254
	5145	5416	3251	5314	6143
	4253	2533	5424	2425	3325
	3242	3254	1243	5253	2543
3.	6325	6436	6323	6546	6546
	4264	2462	2566	3562	4362
	2633	6354	6344	6255	6543
	1462	5633	2565	5364	2544
	6326	3265	6355	4534	6355

4. Give sums at sight, thus : $32 + 40 = 72$; $72 + 5 = 77$.

$32 + 45$	$55 + 34$	$54 + 32$	$26 + 34$	$43 + 44$
$64 + 36$	$56 + 56$	$23 + 34$	$42 + 64$	$25 + 56$
$56 + 45$	$64 + 46$	$42 + 32$	$36 + 25$	$66 + 36$
$64 + 35$	$36 + 25$	$26 + 43$	$53 + 36$	$54 + 26$
$38 + 17$	$37 + 26$	$59 + 17$	$35 + 45$	$25 + 28$
$29 + 16$	$25 + 47$	$57 + 24$	$66 + 26$	$38 + 26$
$19 + 28$	$49 + 26$	$39 + 58$	$47 + 47$	$29 + 25$

SUBTRACTION

From 804 take 365.

1.   We cannot take 5 ones from 4 ones.

   7 9 14   We cannot take 6 tens from 0 tens.

  8 0 4   Take 1 hundred from 8 hundreds; this

  3 6 5   leaves 7 hundreds. 1 hundred equals 10

  4 3 9   tens. Take 1 ten from 10 tens, leaving

            9 tens. 1 ten and 4 ones are 14 ones.

804 therefore is equal to 7 hundreds, 9 tens, and 14
ones.   Subtracting, the difference is 439.

Subtract:

	a	b	c	d	e
2.	6304	7065	6401	8014	4706
	3168	1474	3162	6202	2165
3.	4060	8305	8560	6070	4904
	2976	6012	3574	4304	1060
4.	6105	7805	6099	3940	6303
	2166	4991	4814	2108	1494
5.	8110	4444	6222	8314	8196
	4884	2666	4879	6070	7246
6.	6162	3110	5641	4132	6112
	3104	2904	3212	1841	3897

7. Find the difference between 8904 and 1996;
between 9630 and 2709.

DRILLS IN SUBTRACTION

Subtract, finding 5 remainders in 1 minute:

	a	b	c	d	e
1.	5434	3254	4203	6043	2015
	3565	2435	1564	2564	1356
2.	4360	3204	3204	2010	3014
	2654	1605	1316	1516	2546
3.	3105	4010	6302	3051	6031
	1046	2505	2603	2103	5076
4.	6035	6501	1045	3060	4320
	2456	2436	556	2065	1556
5.	1405	2601	3561	6306	5041
	656	1654	1456	2501	1305
6.	6702	2041	6020	5031	6043
	3026	1554	1615	1025	1245
7.	6103	3014	2031	6072	5102
	2005	2245	1505	4003	3248
8.	5203	6203	4106	2435	5210
	1546	5204	3502	1543	1435

DRILLS IN MULTIPLICATION AND DIVISION

Multiply and divide each number by 2, 3, 4, and 5:

	a	b	c	d	e	f
1.	468	456	273	332	634	804
2.	684	654	372	233	436	972
3.	236	564	732	548	364	729
4.	632	542	412	485	184	908
5.	846	452	214.	854	418	890

Multiply and divide each number by 6, 5, 4, and 3:

6.	426	848	408	798	249	284
7.	264	844	840	897	942	428
8.	624	853	480	789·	429	842
9.	165	790	981	679	257 ·	912
10.	561	970	189	796	725	192

Multiply and divide each number by 2, 4, 6, and 5:

11.	456	295	217	513	665	537
12.	654	925	172	135	656	357
13.	546	529	918	150	250	640
14.	237	592	189	510	520	460
15.	372	712	891	566	502	604

Multiply and divide each number by 3, 5, 6, and 4:

16.	206	666	270	474	228	924
17.	620	246	720	276	282	492
18.	457	426	372	822	249	742
19.	475	642	723	726	846	952

DRY MEASURES

1. Name some dry articles purchased by the pint; by the quart; the peck; the bushel.

2. Secure some sand or grain, and show by actual measurements the number of pints in a quart; the number of quarts in a peck; the number of pecks in a bushel.

3. Memorize this table:

---

2 pints = 1 quart; written, 2 pt. = 1 qt.
8 quarts = 1 peck; written, 8 qt. = 1 pk.
4 pecks = 1 bushel; written, 4 pk. = 1 bu.

---

4. 1 bu. = —— pecks; 1 pk. = —— quarts.

5. How many quarts equal 1 bushel?

6. $\frac{1}{4}$ pk. = —— quarts; $\frac{1}{2}$ pk. = —— quarts.

7. At 10¢ per quart, find the cost of 8 quarts of cherries.

8. At 6¢ per quart, find the cost of 1 peck of hazelnuts.

9. A horse eats 12 quarts of oats a day. How many quarts does it eat in 4 days?

10. $2\frac{1}{2}$ pk. = —— quarts; 16 qt. = —— pecks.

11. James bought $1\frac{1}{2}$ bushels of tomatoes. How many pecks did he buy?

12. If I buy $\frac{1}{2}$ peck of cherries, how many quarts should I get?

LIQUID MEASURES

1. Name some liquids sold by the pint; by the quart; the gallon.

2. Memorize this table:

> 2 pints = 1 quart; written, 2 pt. = 1 qt.
> 4 quarts = 1 gallon; written, 4 qt. = 1 gal.

3. 2 gallons = how many quarts?

4. From a gallon of milk how many quarts could be sold? how many pints?

5. Mrs. Adams buys 2 quarts of milk per day. How many quarts does she buy in 20 days? how many gallons?

6. At 6¢ per quart, how much does the milk cost her per week?

7. From a cask containing 3 gallons of vinegar, how many quarts could be sold?

8. How many pints are there in 12 quarts? how many gallons?

Copy these problems and insert the answers in the blank spaces:

9. 1 qt. = —— pt.

10. 8 qt. = —— gal.

11. 16 pt. = —— qt.

12. 8 gal. = —— pt.

13. 8 pt. = —— qt.

14. 4 gal. = —— qt.

15. 24 qt. = —— gal.

16. 6 pt. = —— qt.

17. 4 qt. = —— gal.

18. 5 gal. = —— pt.

HAM. PRIM. ARITH —6

MEASURES OF WEIGHT

1. Tell how the following articles are sold :
Butter, eggs, milk, cheese, coal, oil.

2. Give the tables of liquid measures and dry measures.

The smallest weight in the picture is called an **ounce weight.** The largest weight is a sixteen-ounce weight, and is called a **pound weight.**

Any article that the pound weight balances is said to weigh just **one pound.**

---

16 ounces = 1 pound ; written, 16 oz. = 1 lb.

---

3. A lady's purchase at the store is balanced by the 8 oz. weight.   What is the weight of her package ?

4. 6 oz. + 4 oz. + 6 oz. = —— lb.

5. 10 oz. + 12 oz. + 10 oz. = —— lb.

6. $\frac{1}{4}$ lb. = —— oz. $\frac{1}{2}$ lb. = —— oz. $\frac{1}{8}$ lb. = —— oz.

7. How many 2 oz. packages weigh 1 pound ?

MEASURES OF LENGTH OR DISTANCE

1. Examine a foot rule.

2. Into how many parts do the long marks divide the rule ?

3. The distance between any two of these marks is called **one inch.**

4. Count the inches in a foot.

5. Place the rule on a paper or on the blackboard and mark off a line 12 inches long.

6. A line 12 inches long is called **one foot.**

---
12 inches = 1 foot; written, 12 in. = 1 ft.
---

7. Short distances are measured in *inches* or *feet.*

8. 6 inches is what part of a foot ?

9. Draw a line $\frac{1}{2}$ ft. in length. How many inches long is the line ?

10. Draw a line $\frac{1}{3}$ ft. in length. How many inches long is this line ?

11. Without the aid of a rule, draw a line 12 inches in length; 6 inches in length; 2 feet in length.

12. Place the rule on the lines in problem 11 and observe how much too long or too short they were drawn.

Pupils should practice this kind of work until they can estimate length quite accurately.

MEASURES OF LENGTH OR DISTANCE

1. Measure the top of your desk in feet and inches.

2. $\frac{1}{4}$ ft. = —— inches; $\frac{1}{3}$ ft. = —— inches.

3. Some articles are sold by a measure 3 times the length of a foot rule. Name some of them.

4. Draw a line on the blackboard 3 feet in length.

5. The line you have drawn is **one yard** long.

<div style="border:1px solid">

3 feet = 1 yard; written, 3 ft. = 1 yd.

</div>

6. A piece of cloth is 6 yards long. How many feet is it in length?

Copy and fill in the blanks:

7. 36 in. = —— ft.   **13.** 4 ft. = —— in.

8. 3 ft. = —— yd.   **14.** $2\frac{1}{2}$ ft. = —— in.

9. 2 ft. = —— in.   **15.** $3\frac{1}{3}$ yd. = —— ft.

10. 60 in. = —— ft.   **16.** 15 ft. = —— yd.

11. 18 ft. = —— yd.   **17.** 7 yd. = —— ft.

12. 3 ft. = —— in.   **18.** 6 ft. = —— in.

Change:

19. 2 ft. and 3 in. to inches.   **25.** 36 in. to yards.

20. 3 ft. and 4 in. to inches.   **26.** 12 ft. to yards.

21. 4 yd. and 1 ft. to feet.   **27.** 24 in. to feet.

22. 6 yd. and 2 ft. to feet.   **28.** 48 in. to feet.

23. 27 in. to feet and inches.   **29.** 36 yd. to feet.

24. 16 ft. to yards and feet.   **30.** $5\frac{1}{3}$ yd. to feet.

MEASURES OF SURFACE

One inch	One inch	One inch
One square inch	One square inch	One square inch

1. Measure this figure with your rule. How long is it? how wide?

2. What is a square inch? How does the entire figure differ from one square inch?

A figure having square corners and longer than it is wide is called an **oblong**.

3. Cut from paper an oblong 1 inch wide and 4 inches long, and fold it to show the number of square inches in it. Do the same with an oblong 2 inches wide and 4 inches long.

4. An oblong is 5 inches long and contains 15 square inches. Draw the oblong to show the width and the number of square inches.

5. An oblong has 24 square inches. It is 6 inches long. Draw the figure on paper. Fold it to show each square inch.

6. An oblong 6 inches long and 3 inches wide will make an oblong —— inches long and 1 inch wide.

7. Show that a square containing 9 square inches is 3 inches on each side.

REVIEW

1. Count by 6's from 1 to 97; from 2 to 98.

2. Count by 7's from 1 to 99; from 2 to 100.

3. Count by 8's from 1 to 97; from 2 to 98.

4. Count by 9's from 1 to 82; from 2 to 101.

5. Express in words: 4112; 9487; 9111.

6. How many pints are there in 4 gallons?

7. How many quarts are there in 5 bushels?

8. How many inches are there in 3 yards?

9. How much time is there between 9 A.M. and 4:30 P.M.? Show by the hands on the clock.

10. A train leaves the station at 11 A.M. and returns in 2 hours and 15 minutes. Give the position of the hands of the clock at the time of its return.

11. A message is sent from the telegraph office when the clock shows 9 A.M. The clock shows 10:15 A.M. when the answer is received. How much time has passed?

12. The weight of four boys is as follows: $64\frac{1}{2}$ lb., 73 lb., $59\frac{1}{2}$ lb., and 78 lb. What is their total weight?

13. A man asked $175 for a horse, but sold it for $15 less. How much did he receive for it?

14. A train leaves the station at 7:35 o'clock A.M. It takes 45 minutes to reach Irwin. Give the position of the hands of the clock at the time it reaches Irwin.

15. How many pints are there in 48 gallons?

READING AND WRITING NUMBERS

In reading large numbers, separate them by commas into groups of *three* figures each, beginning at the right.

Each group is called a **period** and has *ones'* place, *tens'* place, and *hundreds'* place. The last period to the left may contain only one or two figures; as, 8,245; 28,375.

Beginning at the right, the places in 24,205 are called *ones, tens, hundreds, thousands, tens of thousands.* The number is read, " 24 thousand, 205."

Copy, point off into periods, and read:

	a	*b*	*c*	*d*
1.	45268	65283	25834	31849
2.	39371	94736	93687	40306
3.	20905	18110	60009	37000

ROMAN NUMERALS

1. Write the Roman numerals from 11 to 19. Place X before each. This gives the numerals from 21 to 29.

2. XXX = 30. L = 50. XL = 40.
Write the numerals from 31 to 40; from 41 to 50.

3. LX = 60. LXX = 70. LXXX = 80.
Write the numerals from 50 to 70.

4. C = 100. CC = 200. XC = 90. XCIX = 99.
Write the numerals from 70 to 100.
Write 210, 290, 299, 300, 349, 235, 341.
Read XCII, CIX, CCXL, CCXCIX.

ADDITION AND SUBTRACTION OF U. S. MONEY

Read and add:

	a	b	c	d
1.	$.286.75	$ 364.92	$ 615.94	$ 961.37
	931.49	19.39	293.29	149.95
	86.72	187.46	89.67	98.69
	73.87	29.84	173.28	83.75
	68.45	382.73	8.75	278.87
2.	$ 24.35	$ 15.46	$ 21.95	$ 43.74
	13.64	33.71	15.84	17.27
	71.25	16.15	22.65	33.75
	45.32	32.43	16.34	45.45

3. $ 8692 + $ 193.75 + $ 475.86 + $ 286.37 + $ 90

4. $ 187.14 + $ 275.61 + $ 630.18 + $ 5.25 + $ 0.18

5. $ 263.35 + $ 436.75 + $ 195.19 + $ 2.75 + $ 84

Subtract:

	a	b	c	d	e
6.	$ 243.56	$ 315.46	$ 254.73	$ 269.46	$ 226.42
	186.38	169.75	80.06	178.95	9.70
7.	$ 486.35	$ 268.43	$ 124.39	$ 923.14	$ 275.86
	129.76	174.85	86.41	189.67	185.86

Find the difference between:

8. $ 406.75 and $ 216.40   11. $ 436.74 and $ 175.12

9. $ 325.43 and $ 74.65   12. $ 263.37 and $ 144.00

10. $ 468.36 and $ 196.09   13. $ 276.10 and $ 186.19

HALVES

1. Into how many parts has the circle been divided? What is the name of each part? Into how many halves can an object be divided?

2. 1 half apple + 1 half apple = ? $\$\frac{1}{2} + \$\frac{1}{2} = ?$

3. 1 half dozen + 1 half dozen = ? $\frac{1}{2}$ yd. + $\frac{1}{2}$ yd. = ?

Find the sum of:

4. $1\frac{1}{2}$ gal.	**5.** $4\frac{1}{2}$ bu.	**6.** $5\frac{1}{2}$ yd.	**7.** $3\frac{1}{2}$ qt.
3 gal.	$2\frac{1}{2}$ bu.	$4\frac{1}{2}$ yd.	$\frac{1}{2}$ qt.

8. Add:

$15\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2} = 1$; $1 + \frac{1}{2} = 1\frac{1}{2}$.

$9\frac{1}{2}$ Write the fraction $\frac{1}{2}$, and add 1 to the whole

$6\frac{1}{2}$ numbers.

$\overline{31\frac{1}{2}}$

9. $4\frac{1}{2} + 27\frac{1}{2} + 3\frac{1}{2}$ **11.** $11\frac{1}{2} + 25\frac{1}{2} + 42\frac{1}{2}$

10. $9\frac{1}{2} + 18\frac{1}{2} + 27\frac{1}{2}$ **12.** $9 + 37\frac{1}{2} + 86\frac{1}{2}$

Insert the missing number:

13. $4\frac{1}{2}$	$7\frac{1}{2}$	$6\frac{1}{2}$	$8\frac{1}{2}$	$9\frac{1}{2}$	11
+	+	+	+	+	+
$\overline{10\frac{1}{2}}$	$\overline{15\frac{1}{2}}$	$\overline{7\frac{1}{2}}$	$\overline{12\frac{1}{2}}$	$\overline{18\frac{1}{2}}$	$\overline{20\frac{1}{2}}$

Subtract:

14. $8\frac{1}{2}$	$4\frac{1}{2}$	$12\frac{1}{2}$	$11\frac{1}{2}$	$14\frac{1}{2}$	$16\frac{1}{2}$
-5	-3	$-10\frac{1}{2}$	$-9\frac{1}{2}$	$-7\frac{1}{2}$	$-8\frac{1}{2}$

15. $24\frac{1}{2}$	$17\frac{1}{2}$	$25\frac{1}{2}$	$38\frac{1}{2}$	$62\frac{1}{2}$	$49\frac{1}{2}$
$-7\frac{1}{2}$	$-9\frac{1}{2}$	$-18\frac{1}{2}$	$-25\frac{1}{2}$	-37	$-26\frac{1}{2}$

THIRDS

1. How many thirds are there in the oblong? How many thirds are there in one of anything? in 1 yard? How many feet are there in 1 yard? What part of a yard is 1 foot? What part of a yard is 12 inches? How many thirds are there in 2 oranges?

Add:

2. $\frac{1}{3} + \frac{1}{3} = \frac{?}{3}$ $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3}$, or 1 $\frac{2}{3} + \frac{2}{3} + \frac{2}{3} = \frac{6}{3}$, or 2

	a	*b*	*c*	*d*	*e*
3.	$4\frac{1}{3}$	$6\frac{2}{3}$	$5\frac{1}{3}$	$8\frac{1}{3}$	$9\frac{1}{3}$
	$+2\frac{2}{3}$	$+1\frac{1}{3}$	$+4$	$+5\frac{1}{3}$	$+7\frac{2}{3}$
4.	$8\frac{1}{3}$	$7\frac{2}{3}$	$9\frac{1}{3}$	$.7$	12
	$10\frac{1}{3}$	$6\frac{2}{3}$	5	$8\frac{2}{3}$	$8\frac{1}{3}$
	$12\frac{1}{3}$	$8\frac{2}{3}$	$8\frac{2}{3}$	$6\frac{1}{3}$	$9\frac{2}{3}$

Find the missing number:

5.	$8\frac{2}{3}$	$9\frac{1}{3}$	7	$15\frac{1}{3}$	$8\frac{2}{3}$
	$+$	$+$	$+$	$+$	$+$
	$11\frac{2}{3}$	$14\frac{2}{3}$	$12\frac{2}{3}$	$18\frac{2}{3}$	$11\frac{2}{3}$
6.	$7\frac{2}{3}$	$8\frac{2}{3}$	$9\frac{2}{3}$	$18\frac{2}{3}$	$17\frac{2}{3}$
	-3	$-5\frac{1}{3}$	$-4\frac{2}{3}$	$-5\frac{2}{3}$	$-9\frac{2}{3}$

7. I rubbed out $2\frac{2}{3}$ inches from a line $5\frac{2}{3}$ inches long. How long was the part remaining?

FOURTHS

1. Into how many parts has the square been divided? Give the name of each part. What is the difference between a quarter and a fourth of $ 1? of 1 pie? of 1 apple? Into how many fourths can any object be divided?

$\frac{1}{4}$	$\frac{1}{4}$
$\frac{1}{4}$	$\frac{1}{4}$

$\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=$ how many fourths? $\frac{3}{4}$ gal. $+\frac{1}{4}$ gal. $=$?

Find the sum:

2. $ $2\frac{1}{4}+$ $\frac{3}{4}$ **4.** $6\frac{1}{4}$ gal. $+\frac{3}{4}$ gal.   **6.** $8\frac{1}{4}$ bu. $+\frac{3}{4}$ bu.

3. $6\frac{1}{4}+\frac{1}{4}$ **5.** $3\frac{1}{4}$ pk. $+2\frac{2}{4}$ pk.   **7.** $7\frac{3}{4}$ hr. $+1\frac{1}{4}$ hr.

Add:

	a	b	c	d	e	f
8.	$2\frac{1}{4}$	$6\frac{2}{4}$	$5\frac{1}{4}$	$3\frac{1}{4}$	$10\frac{2}{4}$	$12\frac{1}{4}$
	$3\frac{2}{4}$	$7\frac{3}{4}$	$6\frac{1}{4}$	$8\frac{1}{4}$	$7\frac{3}{4}$	9
	$5\frac{1}{4}$	$8\frac{3}{4}$	$25\frac{1}{4}$	$9\frac{1}{4}$	$8\frac{3}{4}$	$8\frac{3}{4}$
9.	11	$18\frac{3}{4}$	$19\frac{1}{4}$	$\frac{3}{4}$	$5\frac{1}{4}$	$20\frac{1}{4}$
	$14\frac{1}{4}$	$16\frac{2}{4}$	8	$\frac{3}{4}$	$6\frac{1}{4}$	8
	$27\frac{1}{4}$	$21\frac{3}{4}$	$62\frac{3}{4}$	$\frac{2}{4}$	17	$31\frac{3}{4}$

Complete:

10. $4\frac{1}{4}+?=9\frac{3}{4}$ **12.** $6\frac{1}{4}+?=11\frac{1}{4}$ **14.** $?+8\frac{1}{4}=15\frac{1}{4}$

11. $6\frac{3}{4}+?=8\frac{3}{4}$ **13.** $9\frac{3}{4}+?=13\frac{3}{4}$ **15.** $?+\frac{1}{4}=6\frac{2}{4}$

Find the difference:

16. $8\frac{1}{4}-7$ **19.** $9\frac{3}{4}-8\frac{1}{4}$ **22.** $19\frac{3}{4}-7\frac{1}{4}$

17. $16\frac{3}{4}-5\frac{1}{4}$ **20.** $16\frac{1}{4}-7\frac{1}{4}$ **23.** $16\frac{1}{4}-8$

18. $23\frac{3}{4}-7\frac{3}{4}$ **21.** $12\frac{2}{4}-11\frac{2}{4}$ **24.** $14\frac{1}{2}-7$

PRACTICAL PROBLEMS

1. A dealer sold $2\frac{1}{4}$ tons of coal at one time and $3\frac{3}{4}$ tons at another time. How many tons did he sell?

2. From a barrel containing $31\frac{1}{2}$ gallons, 25 gallons were sold. How many gallons remained?

3. A dairyman sold in one month $1875\frac{1}{2}$ gallons of milk. He sold 250 gallons less the next month. How much did he sell the second month?

4. A farmer picked potatoes as follows: 23 bu., $24\frac{1}{2}$ bu., and $11\frac{1}{2}$ bu. How many bushels did he pick?

5. After selling $56\frac{1}{2}$ bu. of the potatoes, how many bushels remained?

6. $7\frac{2}{3}$ yards of silk were cut from a piece containing $18\frac{2}{3}$ yards. How many yards remained?

7. A dressmaker used $5\frac{1}{2}$ yards of cloth for a skirt and $2\frac{1}{2}$ yards for a waist. How many yards did she use for both?

8. Mr. Miller owned $30\frac{1}{2}$ acres of land. He kept $24\frac{1}{2}$ acres and sold the remainder at $48 an acre. How much did he receive for the part sold?

9. Find the weight of 4 baskets of butter containing $35\frac{1}{2}$ lb., 18 lb., $22\frac{1}{2}$ lb., and 16 lb., respectively.

10. Harry made $8\frac{1}{2}$ gallons of lemonade and sold 7 gallons. How much was unsold?

11. Find the distance around a room that is $18\frac{1}{2}$ ft. long and 16 ft. wide.

REVIEW

Add the products, and show how to test answers:

1. $\left.\begin{array}{l} 5 \times 20 \\ 4 \times 20 \end{array}\right\}$ 2. $\left.\begin{array}{l} 5 \times 25 \\ 3 \times 25 \end{array}\right\}$ 3. $\left.\begin{array}{l} 4 \times 65 \\ 2 \times 65 \end{array}\right\}$ 4. $\left.\begin{array}{l} 3 \times 126 \\ 4 \times 126 \end{array}\right\}$

Find the difference between the products:

5. $\begin{array}{l} 5 \times 80 \\ 3 \times 80 \end{array}$ 6. $\begin{array}{l} 6 \times 72 \\ 4 \times 72 \end{array}$ 7. $\begin{array}{l} 6 \times 96 \\ 3 \times 96 \end{array}$ 8. $\begin{array}{l} 5 \times 95 \\ 2 \times 95 \end{array}$

9. Add the quotients:

$\frac{1}{5}$ of 75	$72 \div 6$	$\frac{1}{6}$ of 246	$155 \div 5$
$\frac{1}{6}$ of 90	$96 \div 6$	$\frac{1}{3}$ of 225	$273 \div 3$
$\frac{1}{4}$ of 60	$66 \div 6$	$\frac{1}{4}$ of 164	$636 \div 6$

Find the sum in the shortest way:

10.	11.	12.	13.
146	235	946	809
146	235	946	809
146	235	946	809
146	235	946	809
146	235	946	809

Find the sum of the quotients in the shortest way:

14.	15.	16.	17.
$486 \div 6$	$525 \div 5$	$484 \div 4$	$396 \div 3$
$486 \div 6$	$525 \div 5$	$484 \div 4$	$396 \div 3$
$486 \div 6$	$525 \div 5$	$484 \div 4$	$396 \div 3$
$486 \div 6$	$525 \div 5$	$484 \div 4$	$396 \div 3$
$486 \div 6$	$525 \div 5$	$484 \div 4$	$396 \div 3$
$486 \div 6$	$525 \div 5$	$484 \div 4$	$396 - 3$

REVIEW

Divide and test:

1.	$60 \div 5$	5.	$144 \div 6$	9.	$375 \div 5$
2.	$75 \div 5$	6.	$126 \div 6$	10.	$486 \div 6$
3.	$85 \div 5$	7.	$246 \div 6$	11.	$525 \div 5$
4.	$95 \div 5$	8.	$366 \div 6$	12.	$396 \div 6$

13. $6)\overline{300 + 30 + 6} = 6)\overline{336}$ 14. $6)\overline{420 + 12}$

Find the sum in the shortest way:

15. 348	16. 462	17. 564	18. 879
348	462	564	879
348	462	564	879
348	462	564	879
348	462	564	879

Find the sum of the quotients in the shortest way:

19. $426 \div 6 =$	20. $975 \div 5 =$	21. $936 \div 6 =$
$426 \div 6 =$	$975 \div 5 =$	$936 \div 6 =$
$426 \div 6 =$	$975 \div 5 =$	$936 \div 6 =$
$426 \div 6 =$	$975 \div 5 =$	$936 \div 6 =$
$426 \div 6 = \underline{\quad}$	$975 \div 5 = \underline{\quad}$	$936 \div 6 = \underline{\quad}$

22. $25 \cent = \underline{\quad}$ times $5\cent$; $5\cent = \underline{\quad}$ of $25\cent$.

Compare as in No. 22:

23. $35\cent$ and $5\cent$.   27. 42 yards and 6 yards.

24. $60\cent$ and $5\cent$.   28. $44 and $4.

25. $54\cent$ and $6\cent$.   29. 72 pounds and 6 pounds.

26. 60 pints and 6 pints.   30. 1 pound and 4 ounces.

PRACTICAL PROBLEMS

1. At 28 miles per hour, how far can a train run in 6 hours ?

2. When butter is worth 32 cents per pound, how much will 6 pounds cost?

3. At 80 ¢ each, how much will 2 doz. books cost ?

4. A barrel of flour weighs 196 pounds.   After selling $\frac{1}{4}$ of it, how much remains ?

5. Find the cost of 5 pounds of steak at 18 cents per pound.

6. There are 16 ounces in a pound.   How many ounces are there in 6 pounds ?

7. A grocer bought 6 gallons of vinegar at 20 cents per gallon, and sold it at 5 cents per pint.   How much did he make ?

8. Find the cost of 6 bu. of nuts at 90 ¢ per bushel.

9. How many inches equal 5 feet and 4 inches ?

10. How many quarts equal 6 gallons and 2 quarts?

11. When 6 tons of coal cost \$ 30, how much will 1 ton cost ?

12. John buys 5 baskets of grapes for 90 ¢.   How much is that a basket ?   How much do 2 baskets cost ?

13. If Frank prints 42 cards in 6 minutes on his printing press, how many cards does he print in 1 minute ? in 2 minutes ?

14. Mary has 40 cents, and Jane has 6 times as much.   How much more money has Jane than Mary ?

REVIEW·

1. Count by 5's from 0 to 100.

2. Count by 6's from 0 to 120.

The sign·@ followed by a price means "at" so much a unit.   Thus, "3 lb. steak @ 15¢" means "3 lb. steak *at 15¢ a pound;*" "6 doz. buttons @ 20¢" means "6.doz. buttons *at* 20¢ *a dozen.*"

Find the amount of each of the following:

3. 3 lb. steak @ 15¢.

4. 6 bu. potatoes @ 48¢.

5. 6 lb. sugar @ 4¢.

6. 5 cans tomatoes @ 12¢.

7. 6 doz. eggs @ 22¢.

Find the cost of:

8.	5 sheep @. $ 4.75.	13.	6 hats @ $ 1.25..
9.	6 bureaus @ $ 7.75.	14.	5 books @ $ 1.75.
10.	6 cows @ $ 48.	15.	6 lamps @ $ 1.33.
11.	6 rugs @ $ 4.75.	16.	6 wagons @ $.85.
12.	5 vases @ $ 2.65.	17.	5 horses @ $ 175.

18. Add 45 and 56, thus: 45 and 50 are 95; 95 and 6 are 101.

Add in the same way:

19.	35 and 48	23.	78 and 64	27.	19 and 96
20.	18 and 25	24.	84 and 76	28.	78 and 97.
21.	20 and 46	25.	93 and 42	29.	87 and 46
22.	81 and 72	26.	48 and 75	30.	96 and 41

MULTIPLYING BY 7

1. Count by 7's to 21; to 42; to 63; to 84.

2. $2 \times 7 = ?$ $3 \times 7 = ?$ etc., to $12 \times 7 = ?$

3. Build the table of 7's.

4. Compare in value 5×7 and 7×5; 3×7 and 7×3; 7×6 and 6×7; 7×2 and 2×7; 4×7 and 7×4.
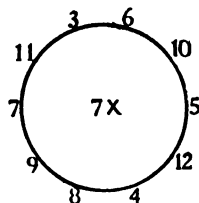
Table of 7's

$1 \times 7 = 7$	$7 \times 7 = 49$
$2 \times 7 = 14$	$8 \times 7 = 56$
$3 \times 7 = 21$	$9 \times 7 = 63$
$4 \times 7 = 28$	$10 \times 7 = 70$
$5 \times 7 = 35$	$11 \times 7 = 77$
$6 \times 7 = 42$	$12 \times 7 = 84$

5. Memorize the table.

6. What multiplicand and multiplier make:

49	12	36	28	24
35	30	14	18	14
25	42	20	27	21
63	84	77	72	54

	a	b	c	d	e
7.	2456	3265	4157	8963	9045
	×7	×7	×7	×7	×7
8.	7739	8497	6198	5424	6339
	×7	×7	×7	×7	×7

Multiply by 7, testing answers:

9.	4693	7528	6934	8576	7935
10.	7208	5697	2469	3875	8094

MULTIPLYING BY 8

1. Count by 8's to 24; to 64; to 96.

2. How many are 2×8 balls? 3×8 books? 4×8 boys? 5×8 pens? 6×8 apples?
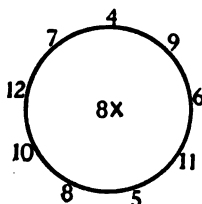
3. Build the table of 8's.

4. Give quickly:

6×8	8×6	7×8	5×8
8×4	8×10	8×2	8×11
8×12	4×8	6×8	8×5

5. Memorize the table.

Table of 8's

$1 \times 8 = 8$	$7 \times 8 = 56$
$2 \times 8 = 16$	$8 \times 8 = 64$
$3 \times 8 = 24$	$9 \times 8 = 72$
$4 \times 8 = 32$	$10 \times 8 = 80$
$5 \times 8 = 40$	$11 \times 8 = 88$
$6 \times 8 = 48$	$12 \times 8 = 96$

6. Give answers:

$? \times 8 = 32$	$7 \times ? = 56$
$6 \times ? = 48$	$? \times 5 = 40$
$? \times 8 = 72$	$8 \times ? = 64$
$10 \times ? = 80$	$? \times 3 = 27$
$12 \times ? = 96$	$2 \times ? = 18$

Multiply by 8:

	a	b	c	d	e
7.	6230	5178	8629	9310	7865
8.	2937	8694	9083	8697	7289
9.	9048	6937	2865	4705	8136

Give products at sight:

10.	8×50	8×70	8×91	8×12	8×31
11.	7×40	7×60	7×71	8×11	7×20
12.	8×90	7×81	8×30	7×21	8×61

PRACTICAL PROBLEMS

1. This schoolroom is 32 feet long and 28 feet wide. What is the distance around it?

2. The glass in each window cost $2.50. How much was paid for all the glass?

3. Each desk cost $3.25. Find the cost of the desks in each long row.
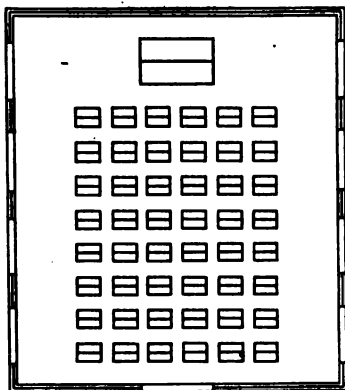
4. Find the value of the desks in the 6 rows.

5. The attendance for the first 8 school days was as follows: 36, 43, 42, 43, 37, 41, 43, 43, respectively. What was the average attendance?

NOTE. — To find the average add the eight numbers and divide the sum by 8.

6. Eight tons of coal were used during the term. How much was paid for the coal at $4.50 a ton?

7. What is the amount of the teacher's salary for 8 months, at $50 a month?

8. Find the entire cost of:

8 Advanced Geographies at $1.00 each.

8 Primary Geographies at $.45 each.

8 Grammars at $.50 each.

8 Language Lessons at $.35 each.

8 Readers at $.48 each.

DIVIDING BY 7

1. How many times is 7 contained in 14? in 21?
42? 63? 28? 35? 49? 70? 77? 56?

2. Find ⅐ of 84; 63; 42; 35; 56; 70; 14; 21.

Divide:

a	b	c	d	e	f
3. 7)42	7)63	7)56	7)49	7)84	7)35
4. 6)72	5)45	6)42	7)28	6)48	7)70

Divide by 7:

5. 84	56	59	68	45	36
6. 217	364	427	637	273	696

Divide and test:

a	b	c	d	e
7. 7)2436	6)7391	7)8693	6)7857	7)4693
8. 5)2609	7)8054	6)3079	7)2096	5)8097
9. 7)7381	6)2867	7)2536	5)3204	7)6973

10. How many 7-pound boxes can be filled from
259 pounds of barley?

11. How many weeks are there in 49 days?

12. How many suits, each requiring 7 yards, can be
made from a piece of cloth containing 84 yards?

13. How many 7¢ packages of crackers can be bought
for $1, and how much money will be left?

DIVIDING BY 8

1. $48 - 8 - 8 - 8 - 8 - 8 = ?$ $48 \div 6 = ?$

2. $2 \times 8 = ?$ $16 \div 2 = ?$ $8 \times 3 = ?$ $24 \div 8 = ?$ $8 \times 4 = ?$

3. $32 \div 8 = ?$ $40 \div 5 = ?$ $56 \div 8 = ?$ $64 \div 8 = ?$ $72 \div 8 = ?$

4. 64 contains 8, —— times   72 contains 8, —— times
    56 contains 8, —— times   48 contains 8, —— times
    96 contains 8, —— times   88 contains 8, —— times

Give quotients:

	a	*b*	*c*	*d*	*e*
5.	8)64	8)32	8)40	8)72	8)56
6.	8)16	7)56	8)24	7)63	8)48
7.	7)35	8)88	7)28	8)96	8)80

Find:

8. $\frac{1}{8}$ of 72 $\frac{1}{8}$ of 64 $\frac{1}{8}$ of 32 $\frac{1}{8}$ of 56 $\frac{1}{8}$ of 48

9. $\frac{1}{8}$ of 640 $\frac{1}{8}$ of 720 $\frac{1}{8}$ of 400 $\frac{1}{8}$ of 320 $\frac{1}{8}$ of 800

Divide by 8:

10. 175	823	629	473	621
11. 8073	2096	3075	4083	6029
12. 2903	8107	2904	7908	8604
13. 6195	2936	8629	4175	2936

14. How many tablets at 8¢ each can be bought for $1, and how many cents will be left?

15. A furniture dealer paid $240 for ice chests at $8 each. How many chests did he purchase?

MULTIPLICATION BY MIXED NUMBERS

A mixed number is composed of an integer and a fraction.

1. Multiply 16 by $2\frac{1}{2}$.　　　　　　　　　　SHORT FORM

$$16$$
$$\underline{2\frac{1}{2}}$$

$\frac{1}{2}$ of $16 = \overline{8}$　　$2\frac{1}{2}$ times 16 means that
$2 \times 16 = 32$　　$\frac{1}{2}$ of 16 is to be added to
$\overline{2\frac{1}{2} \times 16} = \overline{40}$　　2 times 16.

$$16$$
$$\underline{2\frac{1}{2}}$$
$$8$$
$$\underline{32}$$
$$40$$

Find products:

2. $2\frac{1}{2} \times 24$	**8.** $7\frac{1}{3} \times 336$	**14.** $8\frac{1}{7} \times 273$
3. $2\frac{1}{3} \times 36$	**9.** $8\frac{1}{4} \times 124$	**15.** $6\frac{1}{6} \times 258$
4. $4\frac{1}{4} \times 96$	**10.** $9\frac{1}{3} \times 276$	**16.** $8\frac{1}{8} \times 744$
5. $8\frac{1}{2} \times 84$	**11.** $7\frac{1}{6} \times 324$	**17.** $9\frac{1}{5} \times 275$
6. $6\frac{1}{2} \times 60$	**12.** $5\frac{1}{8} \times 288$	**18.** $5\frac{1}{8} \times 392$
7. $8\frac{1}{4} \times 120$	**13.** $7\frac{1}{5} \times 240$	**19.** $9\frac{1}{7} \times 413$

Find the cost of:

20. $8\frac{1}{2}$ gal. oil @ 12¢.　　**27.** $7\frac{1}{2}$ doz. buttons @ 36¢.

21. $6\frac{1}{4}$ bu. potatoes @ 80¢.　**28.** $9\frac{1}{3}$ hours' work @ 18¢.

22. $8\frac{1}{4}$ yd. silk @ $1.20.　**29.** $8\frac{1}{4}$ pounds butter @ 32¢.

23. $7\frac{1}{2}$ gal. milk @ 16¢.　　**30.** $6\frac{1}{2}$ pounds meat @ 16¢.

24. $6\frac{1}{4}$ doz. bananas @ 24¢.　**31.** $7\frac{1}{4}$ pk. peaches @ 40¢.

25. $6\frac{1}{2}$ doz. buttons @ 54¢.　**32.** $3\frac{1}{8}$ yd. muslin @ 16¢.

26. $7\frac{1}{4}$ yd. ribbon @ 28¢.　　**33.** $4\frac{1}{4}$ lb. candy @ 60¢.

MULTIPLYING BY 9

1. Count by 9's to 27; to 54; to 72; to 108.

2. Build the table of 9's.

3. Compare 6×9 and 9×6; 8×9 and 9×8; 10×9 and 9×10.

4. Multiply at sight by 9:

40 60 80 20 50 10 30 70 90 31 51 71

Table of 9's   **5.** Memorize the table.

$1 \times 9 = \ 9$	$7 \times 9 = \ 63$
$2 \times 9 = 18$	$8 \times 9 = \ 72$
$3 \times 9 = 27$	$9 \times 9 = \ 81$
$4 \times 9 = 36$	$10 \times 9 = \ 90$
$5 \times 9 = 45$	$11 \times 9 = \ 99$
$6 \times 9 = 54$	$12 \times 9 = 108$
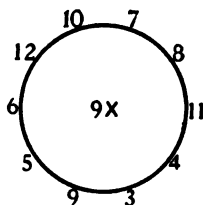
Give two numbers that form each of these products:

6. 21, 36, 44, 48, 50, 40, 54, 45, 33, 18, 27, 99.

7. 88, 90, 60, 77, 81, 63, 66, 72, 56, 108, 96, 80.

Multiply by 9:

	a	b	c	d	e
8.	4693	7286	4615	8738	6957
9.	4135	2874	6398	1869	7043
10.	8286	3697	4589	2893	9097
11.	9387	2945	9384	9387	2864
12.	6005	7894	5009	6090	7500
13.	5020	4080	3074	8005	9999

MULTIPLYING BY 9

Multiply by 9:

	a	b	c	d	e
1.	4226	8393	3786	2468	8321
2.	5483	6692	2294	8329	6245
3.	6396	2594	4968	5692	9374
4.	7278	7246	5328	7386	8928
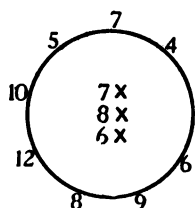
Find the products:

5. 9×38 gal. 9×24 da. 9×16 min.

6. 9×17 bu. 9×25 mo. 9×25 horses

7. 9×12 ft. $9 \times 18 \ell$ 9×35 cows

8. Find products by 7; by 8; by 6.

Table of Elementary Products

In multiplication, there are 45 different combinations of figures taken two at a time, and 36 different products. Use these combinations for drill frequently:

1	1	1	2	1	1	3	1	1	4	1
1	2	3	2	4	5	2	6	7	2	8
3	1	5	6	4	7	5	4	8	9	6
3	9	2	2	3	2	3	4	2	2	3
5	7	8	6	5	9	7	6	8	7	6
4	3	3	4	5	3	4	5	4	5	6
9	8	7	9	8	7	9	8	9	8	9
4	5	6	5	6	7	6	7	7	8	8	9

DIVIDING BY 9

1. How many tables, at $9 each, can be bought for
$18? for $27? for $36? for $45? for $63?

2. Give quotients at sight:

$63 \div 9$	$81 \div 9$	$45 \div 5$	$36 \div 4$	$108 \div 9$
$72 \div 8$	$54 \div 6$	$72 \div 9$	$27 \div 3$	$90 \div 9$
$\frac{1}{9}$ of 36	$\frac{1}{7}$ of 63	$\frac{1}{9}$ of 54	$\frac{1}{8}$ of 56	$\frac{1}{9}$ of 72
$\frac{1}{8}$ of 64	$\frac{1}{9}$ of 45	$\frac{1}{5}$ of 45	$\frac{1}{9}$ of 63	$\frac{1}{7}$ of 56

3. Tell at sight which is greater and how much:

$\frac{1}{9}$ of 81 or $\frac{1}{3}$ of 27 $\frac{1}{8}$ of 40 or $\frac{1}{9}$ of 45

$\frac{1}{8}$ of 64 or $\frac{1}{2}$ of 16 $\frac{1}{7}$ of 63 or $\frac{1}{9}$ of 81

Divide by 9; then by 8:

	a	b	c	d	e
4.	2637	1856	2934	7683	8174
5.	6385	2097	3084	6075	7238
6.	8462	3761	2985	2207	3604
7.	7581	6293	8697	2984	6093

8. Give quotients at sight:

$180 \div 9$	$360 \div 9$	$900 \div 9$	$720 \div 9$	$729 \div 9$
$279 \div 9$	$549 \div 9$	$459 \div 9$	$639 \div 9$	$450 \div 9$

9. If a postman delivers 954 letters in 9 hours, how
many letters does he average in one hour?

10. How many times can 9 inches be marked off
from a line $4\frac{1}{2}$ feet in length?

11. At 3 melons for 15 cents, how many melons can
I buy for 45 cents?

DIVISION OF DOLLARS AND CENTS

Find the products; test and read answers:

a	b	c
1. $4 \times \$2.75$	$7 \times \$82.93$	$8 \times \$93.15$
2. $5 \times \$3.86$	$8 \times \$46.25$	$9 \times \$73.86$
3. $6 \times \$7.27$	$9 \times \$73.87$	$7 \times \$49.25$

4. Divide $6.15 by 3.

Divide $6.15 by 3, placing a *decimal*
3)$6.15 *point* under the decimal point in the divi-
$2.05 dend. Write the dollar sign before the
number of dollars in the quotient.

Find the quotients; read and test answers:

a	b	c
5. $\$4.75 \div 2$	$\$6.75 \div 4$	$\$29.34 \div 9$
6. $\$2.08 \div 2$	$\$8.22 \div 6$	$\$46.72 \div 8$
7. $\$9.27 \div 3$	$\$9.05 \div 5$	$\$71.05 \div 7$

Find:

a	b	c
8. $\frac{1}{3}$ of $\$27.15$	$\frac{1}{4}$ of $\$16.64$	$\frac{1}{7}$ of $\$39.34$
9. $\frac{1}{2}$ of $\$18.24$	$\frac{1}{5}$ of $\$26.70$	$\frac{1}{8}$ of $\$97.68$
10. $\frac{1}{4}$ of $\$20.48$	$\frac{1}{6}$ of $\$38.40$	$\frac{1}{9}$ of $\$27.36$

Perform the operation indicated:

11. $\$273.84 \div 6$	$\$263.75 \div 8$	$\$375.42 \div 6$
12. $\$936.25 \times 5$	$\$423.96 \times 9$	$\$495.67 \div 7$
13. $\$475.83 \times 6$	$\$928.14 \div 6$	$\$321.21 \div 9$
14. $\$721.98 \div 9$	$\$743.68 \div 7$	$\$563.94 \times 8$
15. $\$435.72 \div 8$	$\$269.19 \div 9$	$\$732.75 \times 6$

PRACTICAL PROBLEMS

1. It requires 4 yd. of material to make each of these girls an apron. How much will be required for the class of 7 girls ?

2. At 8¢ a yd., how much will 7 aprons cost ?

3. Out of 9½ yd. of cambric, how many caps, requiring ½ yd. each, can be made ?

4. How many pupils can be supplied with rolling pins and pie pans out of $ 9, if each pin costs 20¢, and each pan 10¢ ?

5. At 18¢ a yard, find the cost of lawn for sleeve protectors for 7 girls, each sleeve requiring ½ yd.

6. Miss Blew, the teacher, purchases the following : 7 flour cans @ 40¢, 7 cake pans @ 25¢, 7 sugar shakers @ 17¢.   Find the amount of her purchases.

7. Entertaining the directors, this class uses 7 spring chickens @ 40¢, 2 pecks of potatoes @ 15¢, 1 head cabbage @ 8¢, 2 boxes tomatoes @ 10¢, ½ lb. butter @ 32¢, 2 pt. cream @ 8¢, and ½ gallon ice cream @ $ 1.50 per gallon.   How much does the dinner cost them ?

MULTIPLICATION AND DIVISION

Multiply and divide by 8; by 9:

	a	b	c	d	e
1.	2465	2469	2816	6824	6178
2.	7381	8397	9375	4836	8293

Find:

3. $\frac{1}{7}$ of 4687 sheep   5. $\frac{1}{9}$ of 7353 bu.   7. $\frac{1}{8}$ of 3600

4. $\frac{1}{8}$ of 9376 horses   6. $\frac{1}{7}$ of 4347 gal.   8. $\frac{1}{9}$ of 7479

How much change shall I receive from $10 for the following? Name the coins in each purchase.

9. $2\frac{1}{2}$ yd. silk @ 60¢   11. 24 lb. butter @ $\frac{1}{4}$

10. $7\frac{1}{3}$ doz. eggs @ 30¢   12. $3\frac{1}{2}$ bu. plums @ $ 2.50

<div align="center">MARKET REPORT</div>

Grapes, per crate,	$2.75	Peaches, per basket,	$1.35
Blackberries, per crate,	$3.50	Pears, per bbl.,	$3.75
Raspberries, per crate,	$3.65	Apples, per bbl.,	$3.50
Elderberries, per crate,	$1.75	Cantaloupes, per box,	$4.50

From the above report find the cost of:

13. 4 crates of blackberries.   20. 9 baskets of peaches.

14. 5 baskets of peaches.   21. 6 crates of blackberries.

15. 3 crates of grapes.   22. 5 crates of elderberries.

16. 3 crates of elderberries.   23. 7 crates of raspberries.

17. 4 bbl. of pears.   24. 6 bbl. of pears.

18. 2 boxes of cantaloupes.   25. 8 boxes of cantaloupes.

19. 6 bbl. of apples.   26. 8 baskets of peaches.

Make other problems from this or another Market Report.

UNITED STATES MONEY

(Notice the groups that make 10 or 15.)

Add:

	a	b	c	d	e
1.	$ 15.73	$ 30.86 ⎱ 15	$ 6.93	$ .48	$ .17
	6.98	15.29 ⎰	32.63	2.75	.28
	.37 ⎱ 15	8.88	4.30	.76	5.70
	5.18 ⎰	.68 ⎱ 15	12.51	5.85	16.37
	40.60	7.27 ⎰	8.78	40.20	4.70
	5.89 ⎱ 10	23.85 ⎱ 10	.36	6.58	23.96
	.31 ⎰	.25 ⎰	.50	18.64	.85

2. Mr. Foster sold in 5 days as follows. Find each day's sales, total sales, and receipts for each article.

	MON.	TUES.	WED.	THURS.	FRI.
	a	b	c	d	e
Corn	$75.25	$68.75	$27.35	$87.45	$64.65
Oats	18.42	26.73	16.72	29.63	37.26
Bran	6.75	3.75	8.25	7.75	9.45
Chop	12.34	8.65	17.38	15.24	16.28
Meal	3.60	5.40	7.60	12.60	17.20
Flour	47.25	68.25	78.75	89.25	110.25

3. A man made 7 deposits as follows: $145.75, $123.34, $134.89, $645.75, $800.05, $900.25, $845.52. How much money did he deposit?

4. My expenses for 6 days were respectively, $1.42, $2.05, $2.36, $2.12, $1.45, and $2.15. What were my expenses for the week?

SUBTRACTION

1. From 5000 take 3456.

<pre>
  4 9 9 10   6 from 10 leaves 4
  5 0 0 0   5 from 9 leaves 4
  3 4 5 6   4 from 9 leaves 5
  ───────   3 from 4 leaves 1
  1 5 4 4
</pre>

	a	b	c	d	e
2.	6734	8090	7004	6000	9000
	4578	5694	5896	4187	3999
	2156	2396	1108	1913	5001

Subtract:

	a	b	c	d	e
3.	9084	7604	5003	8460	6080
	6097	4909	3806	7469	5908
4.	9600	7039	6800	7001	4403
	3097	6799	5009	1903	3040
5.	5004	8040	7409	6400	7003
	3904	4409	3790	4986	6800
6.	8703	6009	8001	5904	9873
	5008	4939	6809	3400	4980
7.	7003	5900	9204	7405	5900
	4906	3098	8909	6097	4397

TEST EXERCISES

Multiply, practicing until nine products can be found in 2 minutes.

1. 4987 by 7		**4.** 2475 by 8		**7.** 6894 by 9	
2. 6879 by 8		**5.** 8689 by 9		**8.** 9829 by 7	
3. 9836 by 9		**6.** 3978 by 7		**9.** 6375 by 8	
10. 8564 by 7		**13.** 8739 by 9		**16.** 8795 by 9	
11. 9873 by 9		**14.** 6927 by 8		**17.** 6938 by 7	
12. 8293 by 8		**15.** 8738 by 9		**18.** 9375 by 8	
19. 9365 by 8		**22.** 7693 by 7		**25.** 8756 by 9	
20. 8796 by 9		**23.** 8795 by 8		**26.** 7938 by 9	
21. 2493 by 7		**24.** 9283 by 9		**27.** 4695 by 7	

Add rapidly:

	a	b	c	d	e
28.	2401	2409	8145	3629	8873
	6375	3875	2693	9483	2345
	5816	4693	7856	2637	5690
	2487	9301	9037	3415	2295
	1789	1432	5009	8007	7986
29.	7895	9982	7743	2239	4498
	2398	1028	3838	4075	7659
	2015	5690	9723	9320	3376
	1920	5497	4587	8756	5072
	6099	4705	8243	6008	3490

PRACTICAL PROBLEMS

1. The drafting room is 24 feet wide and 28 feet long.   What is the distance around the room?

2. There are 7 stands in the room.   Each one cost $ 5.50.   What was the cost of all?

3. Each stand requires a " T " square, angles, scale, erasers, thumb-tacks, etc.   The instruments cost $28.35. What was the average cost of each stand?

4. The first class worked 40 minutes on Monday and Friday of each school week.   How many minutes were spent by the class during 4 school weeks?

5. Each of 7 boys required a drafting board costing 50¢, ink, paper, pencils, etc., costing 25¢.   What was the cost of these materials for the class?

6. The boys made two chairs valued at $ 8.75 each, 3 tabourettes at $ 3.25 each, and 4 book racks at $ 1.25 each.   What was the value of all the articles?

Written]   **REVIEW**   **118**

TEST EXERCISES

Divide, practicing until the quotients **for 9** problems can be found in 2 minutes:

1. 2873 by 7   4. 8196 by 8   7. 2403 by 9
2. 9865 by 8   5. 7963 by 9   8. 8173 by 8
3. 4793 by 9   6. 8910 by 7   9. 6294 by 9

10. 7386 by 8   13. 8197 by 8   16. 4003 by 8
11. 8794 by 9   14. 6934 by 9   17. 6920 by 7
12. 9387 by 9   15. 7879 by 7   18. 3784 by 9

19. 9234 by 7   22. 6010 by 9   25. 3215 by 7
20. 6875 by 8   23. 5362 by 7   26. 8629 by 9
21. 4132 by 9   24. 8104 by 8   27. 9273 by 8

Subtract rapidly:

28. 4284 − 2141   31. 8001 − 6448   34. 8004 − 2234
29. 8401 − 1762   32. 6001 − 4999   35. 7982 − 5460
30. 8109 − 4777   33. 9845 − 3677   36. 5698 − 3472

37. 6024 − 5107   40. 9045 − 4254   43. 3498 − 2004
38. 8460 − 6418   41. 8700 − 4286   44. 6699 − 3342
39. 7200 − 4540   42. 8760 − 4197   45. 7583 − 5620

46. 8794 − 4587   49. 6001 − 2478   52. 5590 − 1056
47. 8476 − 7421   50. 6424 − 3150   53. 9930 − 7810
48. 8921 − 5879   51. 4030 − 3289   54. 9706 − 5897

HAM. PRIM. ARITH. —8

PRACTICAL PROBLEMS

1. A huckster's sales for the week were as follows: $ 3.25, $ 7.15, $ 2.45, $ 6.45, and $ 8.79. What was the amount of his sales?

2. A boy's suit that was marked $ 6.98 was sold for $ 1.25 less. What was the selling price of the suit?

3. James had $ 5.94; he spent $ 2.85. How much had he left?

4. What is the difference in the price of two hats marked $ 4.50 and $ 3.60?

5. ' The following amounts were deposited in the school savings bank: $ 2.15, $ 1.65, $ 7.09, $ 3.68, and $ 9.15. What was the total of these deposits?

6. Mrs. Jones paid $ 2.75 for a turkey, $ .30 for cranberries, $ .15 for butter, and $ .48 for coffee. What was the whole cost?

7. How many school badges 4 in. long can be made from 2 yd. of ribbon?

8. A clock that strikes the half hours strikes how many times in a day?

9. How many square inches are there in an 8-inch square?

10. There are 639 oranges in 9 baskets, with the same number in each. How many are there in each basket?

11. If you receive $ 2.75, $ 6.96, and $ 8.15 and want to change it into five-dollar bills, how many should you get and how much money over?

TEST EXERCISES

Multiply 6 examples in one minute:

By 9		By 7		By 8		By 6	
1.	2467	6.	6935	11.	6238	16.	6294
2.	3258	7.	9186	12.	1459	17.	7386
3.	9614	8.	2734	13.	9345	18.	9281
4.	2836	9.	8567	14.	2764	19.	4936
5.	9214	10.	2137	15.	3285	20.	9275

Divide 8 examples in one minute:

By 8		By 9		By 7		By 6	
21.	8143	26.	8769	31.	8637	36.	8425
22.	2695	27.	2893	32.	2049	37.	6439
23.	7378	28.	6241	33.	9267	38.	9375
24.	6291	29.	7083	34.	7328	39.	8162
25.	9475	30.	1404	35.	8264	40.	3245

41. A farmer's wife sold 72 eggs. How much did she receive for them at 16 cents a dozen?

42. A girl went to the store with 96 cents. She spent 24 cents for butter, and the remainder for sugar at 6 cents a pound. How much sugar did she buy?

43. Mr. Smith had 76 sheep. He kept 60 and sold the remainder at $6 a head. How much did he receive for them?

44. There are 144 ounces in 9 pounds. How many ounces are there in 1 pound?

45. A man earned $100 a month, and spent $75 per month. How much did he save in 6 months?

PRACTICAL PROBLEMS

1. How many pints are there in 2679 gallons?

2. Find the number of pecks in 7320 qt.

3. At 8¢ per quart, for how much does a milkman retail 32½ gallons?

4. Mr. Watson sold a wagon for $75. This was $18.50 more than it cost. Find the cost.

5. A merchant paid $24 for ½ dozen hats. At the same rate, how much should he pay for 9 hats?

6. I sold a house for $7325, which was at a loss of $890. . How much did the house cost me?

7. If I pay $320 for 4 acres of land, how much should I pay for 8 acres of the same kind?

8. How many gallon cans can be filled from 2288 pints of cream?

9. How much will 127 boxes of oranges cost at $6 a box?

10. A man paid $2.75 for a hat, and 8 times as much for a suit. How much money did he spend?

11. At 8¢ a quarter-peck, for how much will a bushel of sweet potatoes retail?

12. I have $54, and pay out ⅑ of it for fuel. How much does the fuel cost?

13. If each of the following numbers is ⅟₇ of another number, what is the number in each case?

7   12   13   8   11   9   1½   5

PRACTICAL PROBLEMS

1. Express in Roman letters: 156, 75, 93, 86, 44.

2. How many quarts are there in $8\frac{1}{2}$ gallons?

3. What is the cost of $5\frac{1}{2}$ pounds of tea at 40 cents a pound?

4. A man bought 7 Standard crates of melons, each crate containing 54 melons. How much did they cost at $3 a crate?

5. Find the cost of 6 yards of silk at the rate of 3 yards for $2.25.

6. Jennie pays 50¢ for $\frac{1}{4}$ of a yard of velvet. Find the value of $2\frac{1}{2}$ yards of velvet at the same rate.

Cost of $\frac{1}{4}$ yd. $= 50$¢.
Cost of $\frac{4}{4}$ yd. $= 4 \times 50$¢, or $2.
Cost of $2\frac{1}{2}$ yd. $= 2\frac{1}{2} \times 2$, or $5.

7. William paid 25¢ for $\frac{1}{4}$ of a bushel of beans. How much would $2\frac{1}{2}$ bushels cost at the same rate?

8. When $\frac{1}{4}$ of a ton of coal costs $1.25, how much will $3\frac{1}{2}$ tons cost?

9. How many quarts are there in 96 pints?

10. A street car left the car-barn at 4.30 A.M. and returned at midnight. How many hours was it in service?

11. One route is $8\frac{1}{2}$ miles long, another is $11\frac{1}{2}$ miles, and a third is 16 miles long. How many miles are there in the three routes?

PRACTICAL PROBLEMS

1. When going to the school picnic, the children marched 4 abreast.   How many rows were there if 816 children attended the picnic?

2. At 3 pencils for 5 cents, how many pencils should be received for 20 cents?

3. Ruth pays 82 ¢ for butter and eggs.   She pays 32 ¢ for butter.   How much does she pay for eggs?

4. Find the cost of $8\frac{1}{2}$ bu. oats at 50 ¢ a bushel.

5. When peaches are selling at the rate of 3 for 5 cents, how many peaches will 40 cents buy?

6. How much money would a lady have left from a $2 bill after buying some muslin for 24¢, lace for 32¢, and ribbon for 27¢?

7. There are 12 months in one year.   How many months are there in $7\frac{1}{2}$ years?

8. A merchant has 6 clerks on his payroll, averaging $45.50 per month.   What is the amount of his payroll for 2 months?

9. A train of cars runs 36 miles an hour.   How far will it run from 11 A.M. to 1:30 P.M.?

10. A trolley car moves at the rate of 352 ft. in a minute.   How far will it move in 7 minutes?

11. At $240 a year, how much rent would a man pay from April 1, 1907 to September of the same year?

12. A dealer bought 8 gal. of ice cream at $1.25 a gallon and sold it at 20¢ a pint.   What was his gain?

REVIEW OF ADDITION AND SUBTRACTION

In review drills like the following the teacher should set a time limit, and make tests of accuracy.

Add:

	a	*b*	*c*	*d*
1.	2404	429	16050	23928
	6020	8500	1081	374
	798	639	321	6504
	3787	10851	4759	233
	6252	3487	19037	1092
2.	6028	3875	4390	29099
	16090	40290	4275	628877
	39099	53961	16503	703903
	10906	8756	88888	79353
	49067	6207	99999	40344

Subtract:

3.	89326	20085	63735	91002
	4967	4736	8924	7988
4.	10050	29003	74035	85483
	6765	16897	38029	3909
5.	87441	10397	63006	83289
	29902	7389	52907	79639

Multiply:

6. 6×735 **8.** 6×54307 **10.** 7×15064

7. 9×197205 **9.** 5×49306 **11.** 8×55034

REVIEW OF DIVISION

Divide and test:

	a	b	c	d
1.	2)24	2)36	2)38	2)56
2.	3)48	3)69	3)108	3)144
3.	4)72	4)96	4)64	4)124
4.	5)385	5)125	5)795	5)970
5.	6)384	6)780	6)564	6)3684
6.	7)2177	7)4635	7)6963	7)4575
7.	8)3344	8)1718	8)19656	8)42408

Give quotients at sight :

8. $152 \div 8$	$177 \div 3$	$172 \div 4$	$184 \div 8$
9. $264 \div 6$	$132 \div 2$	$196 \div 6$	$192 \div 6$
10. $371 \div 7$	$78 \div 2$	$172 \div 4$	$148 \div 4$
11. $468 \div 9$	$96 \div 4$	$235 \div 5$	$273 \div 3$
12. $156 \div 6$	$102 \div 3$	$324 \div 6$	$256 \div 4$
13. $125 \div 5$	$116 \div 4$	$161 \div 7$	$175 \div 7$

Divide and test :

14. $13935 \div 5$

15. $16092 \div 2$

16. $17841 \div 3$

17. $20404 \div 4$

18. $25676 \div 6$

19. $307027 \div 7$

20. $729074 \div 8$

21. $630072 \div 9$

REVIEW OF FUNDAMENTAL OPERATIONS

Give products:

1.	54	36	18	120	125	123	45	75	124
	2	4	2	3	5	3	2	3	2

Add:

	a	*b*	*c*	*d*
2.	$ 4760.27	$ 66908.02	$ 29008.63	$ 349.00
	379.05	40087.29	45.73	290.05
	408.23	23.00	30049.06	79.85
	29635.06	30004.04	709.36	299.69
	4579.98	62.69	8082.59	109.85
	83.07	77003.48	682.01	3405.54
3.	$ 2000.00	$ 8004.61	$ 209.80	$ 805.30
	279.06	9081.45	32.09	610.79
	40.29	11127.69	45000.67	4062.81
	67.00	89042.35	89.05	9654.68
	4002.07	329.30	67005.78	92087.29
	18189.27	42060.60	41.02	2089.62

4. $ 6657 − $ 3498.29

5. 7 × $ 579.83

6. 5 × $ 59.92

7. 4 times $ 125.33

8. 7 times $ 8796

9. $ 48.72 ÷ 8

10. $ 35.35 ÷ 5

11. 3 × $ 147.90

12. $ 83.40 ÷ 6

13. $ 5025.30 − $ 2629.32

14. $ 7059.29 − $ 1637.47

15. $ 9002.63 − $ 1527.49

16. $ 1000 − $ 397.07

17. 4 × $ 4864

18. 9 × $ 8791

19. $ 475.30 ÷ 7

20. $ 79.84 ÷ 8

21. $ 359.46 ÷ 9

REVIEW OF FUNDAMENTAL OPERATIONS

Answer quickly:

	a	*b*	*c*	*d*	*e*
1.	6×3	5×4	$10 - 2$	4×5	$\frac{1}{3}$ of 24
2.	7×10	6×6	$18 - 6$	4×3	$64 \div 8$
3.	9×2	8×10	$40 - 10$	7×6	$\frac{1}{6}$ of 48
4.	7×3	6×5	$\frac{1}{7}$ of 42	9×2	7×8
5.	4×7	10×9	$90 \div 9$	5×5	7×4
6.	$20 - 4$	$\frac{1}{4} \times 28$	8×3	$16 - 10$	$49 \div 7$
7.	$22 - 7$	$\frac{1}{5}$ of 20	7×6	$\frac{1}{2}$ of 24	$\frac{1}{3}$ of 36
8.	6×4	$31 - 6$	$\frac{1}{3}$ of 27	8×7	5×5
9.	4×9	3×10	$54 - 6$	9×6	$28 \div 4$
10.	5×2	$\frac{1}{5}$ of 25	8×3	$8 \div 2$	$\frac{1}{6}$ of 30
11.	8×6	$90 \div 9$	7×9	$\frac{1}{5}$ of 35	6×10
12.	8×5	4×7	$\frac{1}{3} \times 18$	$32 \div 4$	3×3
13.	3×6	$64 \div 8$	$\frac{1}{6} \times 72$	8×8	9×7
14.	$54 - 6$	$72 \div 8$	$\frac{1}{4}$ of 48	5×9	8×3
15.	$39 - 7$	9×8	$47 - 8$	$\frac{1}{4}$ of 44	$\frac{1}{6}$ of 66
16.	$\frac{1}{9}$ of 63	$72 - 9$	$81 \div 9$	$\frac{1}{5}$ of 40	$\frac{1}{6}$ of 42
17.	$\frac{1}{3} \times 36$	$10 - 2$	7×7	$\frac{1}{2} \times 18$	$\frac{1}{4}$ of 36
18.	7×8	9×9	8×7	$81 \div 9$	$56 \div 7$
19.	6×7	9×9	$\frac{1}{5}$ of 30	6×11	8×12
20.	9×12	7×12	$84 \div 7$	3×6	$44 \div 11$

COMPARISON

1. Compare 10 with 5; thus, 10 is two times 5.

2. Compare 5 with 10; thus, 5 is $\frac{1}{2}$ of 10.

NOTE. — We might also compare 5 with 10 by saying 10 is 5 more than 5; but, unless otherwise stated, "compare" in this book means "find the quotient of the first number divided by the second."

3. Compare 30 with 10; 20 with 5; 24 with 6.

4. Compare 5 with 15; 8 with 24; 12 with 48.

5. Compare 40 with 10; with 8; with 5; with 4.

6. Compare 25 with· 5; 5 with 25.

7. When 2 pencils cost 10¢, how much will 8 cost?

8. When 6 hats cost $12, how much will 12 cost?

9. When 4 knives cost $6, how much will 8 cost?

10. At 6 pens for 10¢, how much will 18 cost?

11. When 6 horses cost $900, how much will 24 cost?

24 horses are 4 times 6 horses.   Hence, they will cost 4 × $900, or $3600.

12. When 5 cows cost $160, how much will 30 cost?

13. When 3 barrels of apples cost $7.50, how much will 12 cost?

14. If 5 tons of hard coal cost $32.50, how much will 30 tons cost?

15. At $45 for 60 bu. of wheat, how much will 12 bu. cost?

16. If 12 men earn $51 in one day, how much will 60 men earn in one day at the same rate?

MEASURES OF TIME
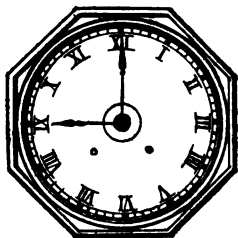
1. Name the letters on the face of the clock. Tell the time.

2. Observe the small spaces on the outer edge of the face. These are called **minute** spaces.

3. Over how many of these spaces does the minute hand move in passing around the face from XII to XII again?

4. How long is the minute hand in passing from XII to I? from V to VI? from X to XI?

5. There are the same number of minute spaces between any two hours.

6. While the minute hand passes from XII to XII again, how far does the hour hand move?

7. How many minutes are there in an hour? (see p. 44) in 2 hr.? in 4 hr.? in ½ hr.?

8. When the hour hand is at XII, what is the time if the minute hand points to V? to III? to I?

9. Count the hours on the clock face from 9 o'clock, the opening of school, until 9 o'clock, the next morning. How many are there? These 24 hours include both day time and night time.

---

60 minutes = 1 hour; written, 60 min. = 1 hr.
24 hours = 1 day; written, 24 hr. = 1 da.

The day always begins at **XII**, **midnight**. The time from midnight to noon is called **forenoon**. The time from **XII**, noon, to midnight is called **afternoon**.

We write **A.M.** for *forenoon* and **P.M.** for *afternoon*. 8 : 20 A.M. is read 20 minutes past eight in the morning.

10. Read 6:10 A.M.; 4:25 A.M.; 6:30 P.M.; 6:45 P.M.; 10:00 A.M.; 5:05 P.M.

11. How many hours is it from 9 A.M. to 5 P.M.? from 10 P.M. to 6 A.M.?

12. How many days is it from 9 o'clock Monday morning to 9 o'clock the next Monday morning?

> **7 days = 1 week; written, 7 da. = 1 wk.**

13. On what day did Feb. 1, 1907, fall? Make a calendar for February, 1907, similar to the one for January.

14. Name the months of the year, beginning with January.

1907	JANUARY					1907
SUN	MON	TUE	WED	THU	FRI	SAT
..	..	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	..	..

> **12 months = 1 year; written, 12 mo. = 1 yr.**

15. How many months are there in 8 years?

16. How many days are there in 6 weeks?

17. How many hours are there in 9 days?

18. How many minutes are there in 4 hours?

MEASURES OF SURFACE

1. Draw a square 1 inch long and 1 inch wide. What shall we call it?

2. Draw on the blackboard a square 1 foot long and 1 foot wide. Call it a **square foot**.

3. Draw on the blackboard a square 1 yard long and 1 yard wide. Call it a **square yard**.
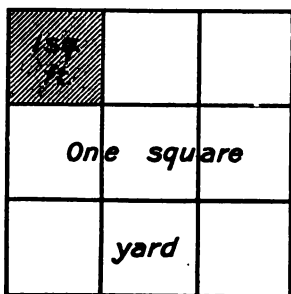
One square yard

4. Separate by points, each side of the square yard into 3 equal parts. Connect these points by straight lines. What is the size of each square? How many square feet are there in a square yard?

5. This picture shows a square yard, smaller than it really is. How many square feet does it show?

9 square feet=1 square yard; written, 9 sq. ft.=1 sq. yd.

6in

4in
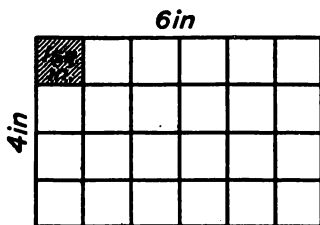
6. This picture shows an oblong 6 inches by 4 inches. Divide it into square inches. How many square inches are there in one row? in 2 rows? in 3 rows? in 4 rows?

In 1 row there are 6 sq. in.

In 4 rows there are 4 × 6 sq. in. = 24 sq. in.

SURFACES

Draw figures and find the number of square inches in :

1. An oblong 1 in. wide and 4 in. long.
2. An oblong 2 in. wide and 6 in. long.
3. An envelope 2 in. wide and 6 in. long.
4. A blotter 3 in. wide and 6 in. long.
5. A page 4 in. wide and 6 in. long.
6. A square 3 in. on a side.
7. A square 4 in. on a side.
8. The top of a box 5 in. on a side.
9. A picture 4 in. by 6 in.

With one inch representing a foot, draw figures and find the number of square feet in :

10. A rug 3 ft. wide and 8 ft. long.
11. A hallway 4 ft. wide and 10 ft. long.
12. A table cover 7 ft. by 4 ft.
13. A window glass 4 ft. by 9 ft.
14. The glass for a picture 2 ft. by 3 ft.

With one inch representing a yard, draw figures and find the number of square yards in :

15. A room 4 yards by 6 yards.
16. A porch floor 2 yards wide and 8 yards long.
17. A hallway 3 yards wide and 12 yards long.
18. A rug 3 yards wide and 5 yards long.
19. A porch rug 2 yards wide and 4 yards long.
20. A wall 3 yards in height and 6 yards long.
21. A blackboard 1 yard in height and 8 yards long.

PRACTICAL PROBLEMS

Apples. Best, $2.25 ;
    Fair grades, $1.50 per bbl.
Peaches. Good, $2.25 ;
    Fancy, $2.50 per bu.
Pears. Best, $1.50 per bu.
Grapes. Niagara, 25¢ per 10-lb.
    basket.
    Concords, 28¢ per 10-lb. basket.

Eggs. 18¢ per doz.
Butter. Creamery, 28¢ per lb.;
    Dairy, 25¢ per lb.
Cheese. Full cream, 12½¢ per lb.
    American, 15¢ per lb.
Potatoes. 50¢ per bu.
Sweet potatoes. Virginia, 80¢ ;
    Jersey, $1.25 per bu.

From this market report find the cost of the following:

1. 8 bu. of fancy peaches.

2. $4\frac{1}{2}$ lb. of butter, creamery.

3. $5\frac{1}{2}$ bu. of potatoes.

4. 8 10-lb. baskets of Concord grapes.

5. 7 bbl. of apples, best quality.

6. 9 cases of eggs, 30 dozen each.

7. 8 10-lb. baskets of Niagara grapes.

8. $8\frac{1}{2}$ bu. of sweet potatoes, Virginia.

9. 7 bu. of peaches, good.

10. 9 full cream cheese, 15 lb. each.

11. 7 10-lb. baskets of Concord grapes.

12. $9\frac{1}{2}$ bu. of pears, best quality.

13. 8 bbl. of apples, fair grades.

14. 7 lb. of creamery butter and 32 lb. of dairy butter.

15. 8 bu. of fancy peaches, and 42 bu., good quality.

16. 8 10-lb. baskets of Concord grapes, and 6 10-lb. baskets of Niagara grapes.

PRACTICAL PROBLEMS

1. A dealer bought 6 bicycles at $34.25 each. What was the entire cost?

2. What is the value of 6 lots at $ 675 each?

3. How many barrels of apples, at $ 5 a barrel, can be bought for $ 2725?

4. A farmer bought 8 cows for $ 336. What was the average cost?

5. A train runs at the rate of 48 miles an hour. How far will it run in $8\frac{1}{4}$ hours?

6. $96.64 was divided equally among 8 men. How much did each receive?

7. A man earns $ 1475 a year; and his son $\frac{1}{5}$ as much. How much does the son earn? How much do both earn?

8. A farmer raised 1683 bushels of corn and $\frac{1}{9}$ as many bushels of potatoes. How many bushels of potatoes did he raise?

9. There are 420 trees in Mr. Bane's orchard; $\frac{1}{6}$ are plum trees, and $\frac{1}{7}$ peach trees. How many trees are there of each?

10. A laborer worked $8\frac{1}{2}$ days at $1.80 a day. How much did he earn?

11. I paid $52.50 for 7 tons of hard coal. What was the price of 1 ton?

12. If a school is in session 6 hours a day, how many hours of school are there in 20 days?

PRACTICAL PROBLEMS

1. How many pounds of sugar are there in 7 packages of 25 lb. each?

2. There are 248 pages in a book. When 89 pages are read, how many pages remain unread?

3. A barrel of flour weighs 196 pounds. How much is left after 68 pounds have been sold?

4. There are 32 quarts in a bushel. How many quarts equal 7 bushels?

5. If there are 9 school months in a year, how many school months are there in 12 years?

6. In a purse there are $3, 3 quarters, 6 dimes, 4 nickels, and 4 cents. How much money is in the purse?

7. A horse traveled 36 miles in 6 hours; a bicycle the same distance in 4 hours. Find the speed of each.

8. There are 181 pupils on the second floor of a school building and 157 on the third floor. How many are there on both floors? How many more are on the second floor than on the third?

9. A bushel of shelled corn weighs 56 pounds. How many pounds are there in a box holding 8 bushels?

10. There are 144 pens in a gross. How many are there in 9 gross?

11. There are 24 sheets of paper in a quire. How many are there in 8 quires?

12. How much will 18 pounds of figs cost at $9\frac{1}{2}$ cents per pound?

REVIEW

Subtract:

1. 989	2. 686	3. 9988	4. 9659
877	540	8965	6806

5. Add the remainders in examples 1, 2, 3, and 4.

Add the products; show a short way of testing each problem:

6. 4×40	7. 7×36	8. 6×65	9. 3×78
$+ 5 \times 40$	$+ 2 \times 36$	$+ 2 \times 65$	$+ 6 \times 78$

Divide and test:

10. 342 by 3	14. 868 by 8	18. 639 by 9
11. 964 by 8	15. 594 by 6	19. 584 by 7
12. 982 by 7	16. 805 by 8	20. 810 by 9
13. 878 by 8	17. 959 by 7	21. 899 by 9

Give quotients at sight:

22. $220 \div 2$	26. $330 \div 3$	30. $350 \div 5$
23. $840 \div 4$	27. $960 \div 9$	31. $780 \div 3$
24. $720 \div 9$	28. $690 \div 3$	32. $920 \div 4$
25. $860 \div 4$	29. $980 \div 4$	33. $880 \div 8$

Give products at sight:

34. 4×40	38. 6×110	42. 7×107
35. 6×50	39. 3×202	43. 8×208
36. 8×20	40. 5×105	44. 9×102
37. 9×50	41. 4×222	45. 9×110

REVIEW OF THIRD YEAR

1. There are 8 pints in one gallon. How many pints are there in 36 gallons?

2. A train runs 26 miles in 1 hour. How far can it run in 9 hours?

3. How much will $8\frac{1}{4}$ yards of cloth cost at 32 cents per yard?

4. At the rate of 9 pages an hour, how long will it take to finish a story of 27 pages?

5. Nine girls spent $4.95 at a picnic. What was the average amount spent by each?

6. At 6 cents a pound, how many pounds of sugar can be bought for 138 cents?

7. There are 168 cabbage plants in 8 rows. How many are there in each row?

8. James saves $7 a week from his wages. How long will it take him to pay for a lot valued at $238?

9. A drover paid $2040 for sheep at $6 a head. How many did he buy?

10. Eight lamps cost $17.28. Find the cost of one.

11. How many bushels equal 396 pecks?

12. How many gallons equal 792 pints?

13. How many tons of coal, at $6 a ton, can be bought for $786?

14. How much milk at 8 cents a quart can be bought for $2.56? ($2.56 = 256¢.)

15. I paid $12.54 for berries at 6 cents a box.   How many boxes did I buy?

16. A man divided $875 among his 7 children. How much did each child receive?

17. How many weeks are equal to 287 days?

18. If 9 hours' work is counted as a day's work, for how many days should a man be paid who has worked 342 hours?

19. 6 melons cost 78 cents.   How much is that apiece?

20. How many yards equal 54 feet?

21. At 48 cents a gallon, what is the cost of a pint of molasses?

22. If 6 barrels of apples cost $13.50, what is the cost of 1 barrel?

Find the cost of:

23. 8 hats @ $3.	**29.** 7 pr. shoes @ $4½.
24. 7 beds @ $9.	**30.** 12 melons @ 8¢.
25. 7 qt. milk @ 8¢.	**31.** 6 bbl. flour @ $4½.
26. 8 books @ $2.	**32.** 7½ lb. sugar @ 8¢.
27. 4 gal. oil @ 25¢.	**33.** 8 yd. of cloth @ 50¢.
28. 6 chairs @ $3½.	**34.** 8 spools thread @ 10¢.

35. Eight men paid $2.50 each to the Fresh Air Fund.   How much was given by all?

36. Mr. Brown paid $400 for 8 acres of land.   How much were 24 acres worth?

37. Seven o'clock A.M. is how many hours after midnight?

38. 144 square inches make one square foot. How many square inches equal 8 square feet?

39. At $7.50 each, how much will 7 suits of clothing cost?

40. How much will $8\frac{1}{4}$ pounds of pork cost at 12¢ a pound?

41. At $4.75 each, how much will 8 hats cost?

42. Mrs. White paid $2.25 a yard for velvet. How much would she pay for 7 yards at the same rate?

43. Joseph Black employs 8 clerks at a salary of $15.50 a week each. How much must he pay his clerks at the end of the week?

44. At 3 palings to the foot, how many palings are required for a fence 12 yards and 2 feet in length?

45. How much will an $8\frac{1}{2}$ pound roast of veal cost at 16¢ a pound?

46. 8 gallons of ice cream were sold at 15¢ a pint. How much was received for it?

47. At 25¢ a peck, for how much will 2 bu. of tomatoes retail?

48. A man sold a horse for $230 and lost $56. How much did the horse cost him?

49. Mr. Frank rented a house at $360 a year. How much rent will he pay in $7\frac{1}{2}$ years?

50. A man hires a horse for 35¢ an hour. How much must he pay if he uses the horse from 10 A.M. until 5 P.M.?

51. A man bought a lot for $1275. He built a store-room on it for $2450. He sold the property for $5000. Find his gain.

52. What is the weight of 6 sacks of wheat, each weighing 168 pounds?

53. How much will $8\frac{1}{2}$ tons of coal cost at $4.50 a ton?

54. 9 tons of coal for a school cost $38.25. How much was that a ton?

55. A school has 2 floors, with 4 rooms on each floor. How many pupils are there in the school, if there are 36 pupils in each room?

56. A teacher in this school earns $65 per month, and spends $35. How much does he save in 9 months?

57. Find the cost of $8\frac{1}{2}$ yards of dress goods at 48 cents per yard.

58. A pair of shoes costs $2\frac{1}{2}$. How much will 7 pairs cost?

59. If I pay 96 cents for 3 yards of ribbon, how much should I pay for 1 yard? for $1\frac{1}{2}$ yards?

60. The distance from New York to Pittsburg is 444 miles. What is the fare for a round trip, at 2¢ per mile?

61. The fare at 2 ¢ per mile, from Pittsburg to Harrisburg is $ 4.96. Find the distance.

62. Trains leave Pittsburg for Wheeling, 7 A.M. and 8:30 A.M., returning 3:45 P.M. and 5:30 P.M. Find the difference in time of leaving; in time of returning.

63. How much will 7¼ yd. of cloth cost at $ 2.12 a yard?

64. A spool of thread contains 200 yards. How many feet of thread are there on ½ dozen spools?

65. Tell the meaning of each figure in these numbers: 4069; 27304; 50100; 73614; 80001.

66. Express in words: 84244; 93712; 65111; 52316; CCXV; CCCXL; LXXXIX.

67. If you sold a person goods to the amount of 94 cents, and received $ 2 in payment, what coins might you give in change?

68. Nine persons were served with meals at $ 1.75 each, 5 persons were served at $ 1.25 each, and 3 persons at 90 ¢ each. Find the total amount of money received.

69. A train reached the city at 11:45 A.M. and left at 2:10 P.M. How long did it remain in the city?

70. A man earns $ 125 a month and spends $ 96 a month. How much can he save in ½ a year?

71. By selling a house for $ 4785, Mr. Thompson lost $ 895. How much did the house cost him?

PART III — FOURTH YEAR

READING AND WRITING NUMBERS

Review pages 41, 42, and 87.

For convenience in reading large numbers, the figures are generally separated by commas into groups of three figures each, called **periods.**

The first period, counting from the right, is **units;** the second, **thousands;** the third, **millions.**

The following table shows the arrangement of these periods, and the three orders of figures in each period:

MILLIONS' PERIOD			THOUSANDS' PERIOD			UNITS' PERIOD		
Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-thousands	Thousands	Hundreds	Tens	Ones
2	0	4,	6	4	1,	3	7	6

The number in the table is read, "204 million, 641 thousand, 376."

Copy, point off, and read:

	a	b	c	d
1.	2000	20135	81125	125125
2.	20000	20648	48760	625840
3.	21000	56506	40084	1760894
4.	36000	94600	61006	8300404

READING AND WRITING NUMBERS

Express in figures :

1. Forty-two thousand.
2. Sixty-six thousand four.
3. Seventy-five thousand fifty.
4. Thirty-nine thousand one hundred twenty-two.
5. Two hundred ten thousand three hundred fifty.
6. Five hundred sixty-five thousand one hundred.
7. One million one hundred twenty-five thousand.
8. Three million six hundred thousand thirty-five.
9. Twenty-five million nine thousand twenty-six.
10. Eighty million twenty-six thousand sixty-four.
11. Nine hundred thousand nine.
12. Forty-six million four thousand sixteen.
13. One hundred ten million five hundred.
14. Three hundred thirty-six million one hundred four.
15. Five hundred seven million five thousand six.
16. Seventeen million three thousand seventy-five.
17. One million two thousand seven hundred four.
18. 1 million, 104 thousand, 185.
19. 21 million, 110 thousand, 109.
20. 604 million, 622 thousand, 468.
21. 101 million, 10 thousand, 10.

ADDITION AND SUBTRACTION

Review pages 44 to 55, 67, 68, 77, 78, 88, 109, 119, and 121.

1. Count by 4's from 2 to 100 ; from 3 to 99.
2. Count by 6's from 3 to 99 ; from 5 to 101.
3. Count by 8's from 3 to 99 ; from 4 to 100.

Add the following, allowing five minutes for each :

	a		b		c		d	
4.	$32.45	+	$50.75	+	$32.11	+	$321.65	=
	61.79	+	1.24	+	2.84	+	94.76	=
	8.15	+	6.19	+	16.31	+	8.92	=
	23.42	+	83.72	+	5.49	+	143.74	=
	94.76	+	9.85	+	26.32	+	25.81	=
	$	+	$	+	$	+	$	= $

	a		b		c		d	
5.	$35.18	+	$85.24	+	$21.89	+	$ 86.42	=
	92.76	+	8.93	+	39.65	+	93.84	=
	9.84	+	16.82	+	84.21	+	2.69	=
	26.37	+	73.25	+	16.93	+	39.87	=
	81.74	+	4.68	+	12.85	+	71.44	=
	$	+	$	+	$	+	$	= $

Subtract, allowing one half minute for each :

	a	b	c	d
6.	$275.43	$536.75	$408.37	$674.26
	167.35	308.28	286.58	210.75
7.	$682.72	$826.45	$527.05	$763.72
	79.80	60.76	89.98	140.80

PRACTICAL PROBLEMS

1. A man paid $2.50 for a hat and $15.50 for a suit. How much did he pay for both?

$$\begin{array}{r} \$\,2.50\text{, cost of hat.} \\ \underline{15.50\text{, cost of suit.}} \\ \$\,18.00\text{, cost of both.} \end{array}$$

2. A merchant sold 425 bu. of potatoes, 232 bu. of apples, and 189 bu. of onions. Find the total number of bushels sold.

3. A lady paid $25 for a carpet, $71 for a rug, and $7 for curtains. What was the amount of her bill?

4. How many days are there in the last six months of the year?

5. A man left his estate to his wife, son, and daughter. His wife received $9845, his son $3650, and his daughter $3500. What was the value of the whole estate?

6. I sold my house for $5675, thereby losing $897. How much did the house cost?

7. A lawn is 30 ft. long and 24 ft. wide. How many feet is it around the lawn?

8. New York is 327 miles east of Altoona by railroad and Pittsburg is 117 miles west. How far is it from New York to Pittsburg?

9. The pupils of a school deposited money in a savings bank as follows: January, $16.45; February, $14.60; March, $18.35; and April, $17.51. Find the total deposits.

PRACTICAL PROBLEMS

1. A ranchman bought 468 cows and sold 239 of them. How many had he left?

> 468, number of cows bought.
> 239, number of cows sold.
> ———
> 229, number of cows remaining.

2. Mr. Jones was born in 1851. How many years old is he if now living?

3. A man's property sells for $47892. He owes $36987. How much has he left after paying all his debts?

4. In a certain election A received 38714 votes and B 29867 votes. How much did A's vote exceed B's?

5. I sold a farm for $5628, which was at a gain of $1394. What was the cost of the farm?

6. A merchant bought 26520 bu. of grain and sold 18296 bu. How many bushels had he left?

7. The population of a town is 8596. Ten years ago it was 2397. What was the increase in ten years?

8. A man's salary is $2525 a year. His expenses are $1786. How much can he save in a year?

9. A barrel of flour weighs 200 lb. The barrel itself weighs 4 lb. How many pounds of flour are there in a barrel?

10. At an election the whole number of ballots cast was 11342. Of this number A received 8673. How many votes were cast for his opponent?

MULTIPLYING BY 10 .

1. Count by 10's to 100.   Build the table of 10's.

2. How many are 9×10 ? $90 + ? = 100$.

3. Place a naught to the right of 4.   What number have you ?   40 is how many times four ?   Place a naught to the right of 6; 3; 7; 9; 11; 12.   See whether each product has become ten times the minuend.

Annexing a naught to the right of a number multiplies it by 10.

4. Annex 0 to each number.   Notice the effect:

4	20	36	75	42	87	275
93	87	692	387	509	938	765

Table of 10's   **5.** Memorize the table.

Table of 10's
$1 \times 10 = 10$ $7 \times 10 = 70$
$2 \times 10 = 20$ $8 \times 10 = 80$
$3 \times 10 = 30$ $9 \times 10 = 90$
$4 \times 10 = 40$ $10 \times 10 = 100$
$5 \times 10 = 50$ $11 \times 10 = 110$
$6 \times 10 = 60$ $12 \times 10 = 120$

6. Compare :

10×5 with 5×10

8×10 with 10×8

11×10 with 10×11

40 and 80   100 and 10

120 and 12   110 and 11

Find the cost of :

7. 10 newspapers @ 5¢.

8. 8 ladies' hats @ $ 5.

9. 10 oranges @ 2 for 5¢.

10. $10\frac{1}{2}$ yd. muslin @ 12 ¢.

11. $9\frac{1}{2}$ lb. lard @ 10¢.

12. $12\frac{1}{2}$ doz. buttons @ 10¢.

13. 10 qt. milk @ 8¢.

14. $10\frac{1}{4}$ bu. tomatoes @ 80¢.

MULTIPLYING BY 11

1. Count by 11's to 33; to 66; to 99. Build the table of 11's.

2. $9 \times 11 = ?$ $99 + 11 = ?$ How many 11's $= 110$?

3. $10 \times 11 = ?$ 10 times 11, plus $11 = ?$ How many are 11×11?

4. To find 12×11 how many must be added to 11×11? $12 \times 11 = ?$

5. Give at sight:

10×11	12×11	5×11
3×11	4×11	8×11
6×11	11×9	11×7
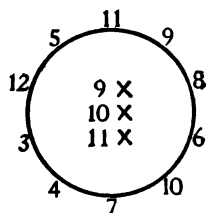
Table of 11's

$1 \times 11 = 11$	$7 \times 11 = 77$
$2 \times 11 = 22$	$8 \times 11 = 88$
$3 \times 11 = 33$	$9 \times 11 = 99$
$4 \times 11 = 44$	$10 \times 11 = 110$
$5 \times 11 = 55$	$11 \times 11 = 121$
$6 \times 11 = 66$	$12 \times 11 = 132$

6. Memorize the table.

7. Compare:

11×7 with 7×11

9×11 with 11×9

11×4 with 4×11

12×11 with 11×12

6×11 with 11×6

8. Find the products:

11×60	11×80	11×40	11×100	11×30
11×90	11×50	11×20	11×80	11×25
11×13	11×30	11×70	11×15	11×18

Find:

9. $\frac{1}{11}$ of 132; of 88; of 121; of 110.

MULTIPLYING BY 12

1. Count by 12's to 36; to 72; to 144. How many are 12 times 12? Build the table of 12's.

Table of 12's

$1 \times 12 = 12$	$7 \times 12 = 84$
$2 \times 12 = 24$	$8 \times 12 = 96$
$3 \times 12 = 36$	$9 \times 12 = 108$
$4 \times 12 = 48$	$10 \times 12 = 120$
$5 \times 12 = 60$	$11 \times 12 = 132$
$6 \times 12 = 72$	$12 \times 12 = 144$

2. Memorize the table.

3. Multiply by 12; by 11:

465	236	789
546	783	928
784	937	693
785	514	938
978	694	296

---

1 dozen = 12   1 gross = 144

---

4. What two numbers make the following products?

25	27	28	30	32	35	36	40	42	45	48
49	56	60	63	64	66	72	80	84	88	96

MULTIPLICATION BY A MIXED NUMBER

1. Multiply 34 by $4\frac{1}{2}$. $4\frac{1}{2}$ times 34 means that $\frac{1}{2}$ of 34 is to be added to 4×34.

$$34$$
$$\underline{4\frac{1}{2}}$$
$$\overline{17} = \frac{1}{2} \text{ of } 34$$
$$\underline{136} = 4 \text{ times } 34$$
$$\overline{153} = 4\frac{1}{2} \text{ times } 34$$

Find the products:

2. $8\frac{1}{2} \times 48$ **4.** $8\frac{1}{4} \times 120$

3. $9\frac{1}{3} \times 72$ **5.** $6\frac{1}{3} \times 180$

6. $7\frac{1}{4} \times 84$ **7.** $5\frac{1}{2} \times 242$ **8.** $12\frac{1}{2} \times 224$

DIVIDING BY 10

1. Begin with 0 and count by 10's to 100. Beginning with 1 count by 10's to 101.

2. 50 is how many times 5 ? How does 60 compare with 6 ? Remove zero from 80. What is the result ? 8 is what part of 80 ?

3. Remove naught from 30; from 90; from 70. How does the result in each case compare with the number?

4. 3 is what part of 30 ? 4 is what part of 40 ? $\frac{1}{10}$ of $40 = ?$

Removing a naught from the right of any number divides it by 10.

5. Divide by 10: Complete in two minutes.

40	30	90	80	60	100	120
320	560	980	750	360	470	920
1450	1680	2450	1930	2210	9990	7400
6320	4040	3100	2010	8500	7280	6900

6. How many 10-cent balls can be bought for $1.00? for $2.00? for $5.00?

7. At 10 cents a quart, how many quarts of milk can be bought with $2.80 ?

8. How long will it take a motor car going 10 miles an hour to travel 140 miles ?

9. If I pay 50¢ for a telegram of 10 words, how much do I pay for each word ?

DIVIDING BY 11 AND 12

1. Subtract by 11's from 132 to 0.

2. State quotients at sight:

$33 \div 11$	$66 \div 11$	$88 \div 11$	$132 \div 11$
$44 \div 11$	$77 \div 11$	$99 \div 11$	$121 \div 11$

3. Find $\frac{1}{11}$ of: 88; 99; 22; 78; 33; 48; 44; 55; 69; 11; 66; 81; 77; 92; 88; 99; 110; 121; 83.

Divide by 11: Test answers.

4. 2738	**7.** 6954	**10.** 8923	**13.** 69753
5. 8294	**8.** 3986	**11.** 2158	**14.** 73065
6. 2036	**9.** 3007	**12.** 8057	**15.** 90074

16. Subtract by 12's from 144 to 0.

17. State quotients at sight:

$36 \div 12$	$60 \div 12$	$84 \div 12$	$132 \div 12$
$24 \div 12$	$96 \div 12$	$108 \div 12$	$144 \div 12$

18. Find $\frac{1}{12}$ of: 96; 84; 72; 36; 108; 24; 120; 132; 60; 48; 144.

Divide by 12: Test answers.

19. 3678	**24.** 7817	**29.** 42192	**34.** 91875
20. 4135	**25.** 2936	**30.** 69378	**35.** 24726
21. 6973	**26.** 9238	**31.** 73945	**36.** 68359
22. 7128	**27.** 4697	**32.** 82659	**37.** 81763
23. 4693	**28.** 9384	**33.** 37296	**38.** 92364

REVIEW

Find the cost of :

1. 9 rings @ $3
2. 12 cows @ $35
3. 10 hats @ $3.65
4. 10 rugs @ $1.50
5. 3 wagons @ $85
6. 9 plates @ $1.75
7. 10 knives @ $.75

8. 10 vases @ $2.39
9. 10 horses @ $95
10. 11 books @ $2.25
11. 11 sheep @ $4.75
12. 10 chairs @ $5.25
13. 6 chickens @ 75¢
14. 12 pictures @ $4.50

Find the cost of 1, when :

15. 12 lamps cost $51
16. 4 cases cost $32.48
17. 10 sleds cost $19.50
18. 10 sheep cost $45.00
19. 11 desks cost $35.75
20. 8 trunks cost $57.60
21. 10 clocks cost $48.50
22. 5 hats cost $15
23. 12 hats cost $27
24. 8 lb. rice cost 96¢
25. 3 clocks cost $9.75
26. 9 books cost $11.25
27. 5 chairs cost $15.45
28. 9 lb. nuts cost $2.25
29. 8 bu. coal cost $1.20

30. 10 satchels cost $35.50
31. 12 yd. lace cost 48 ¢
32. 11 lb. steak cost $1.98
33. 6 gal. vinegar cost 72¢
34. 12 bu. potatoes cost $9
35. 12 pk. tomatoes cost $3
36. 10 toy engines cost $35
37. 5 lb. steak cost $1.10
38. 8 qt. cream cost $1.60
39. 4 bu. cherries cost $15
40. 10 yd. silk cost $17.50
41. 10 pt. cream cost $1.10
42. 11 lb. butter cost $2.20
43. 3 pairs shoes cost $9.75
44. 12 collars cost $2.40

REVIEW

1. A train runs 378 miles in 7 hours. How many miles is that in 1 hour?

2. A ticket agent has $5.85 in his drawer. After selling 2 tickets at 90¢ each, 8 tickets at 70¢ each, and 1 mileage book for $20, how much money should his drawer contain?

3. While the hour hand is going 8 times around the dial how often does the minute hand go around?

4. The treasury of a school district contains $2642. After paying the salaries of six teachers for 8 months at $45 per month, how much remains?

5. A farmer sold 4 jars of butter containing respectively, 24 pounds, 27 pounds, 26 pounds, and 33 pounds. How many pounds did he sell?

6. A newsboy earns 30 cents a day. How much will he earn in 4 weeks of 6 days each?

7. What is left from a $10 bill after paying for $10\frac{1}{2}$ lb. of tea at 60 cents a pound?

8. The expenses for a family for a year are as follows: food, $485; fuel and light, $86; car fare, $35; clothing, $285; church, $68; books and papers, $25; servant, $165; other expenses, $278. Find the entire expenses.

9. In a school of 897 pupils, there are 487 girls. How many boys are there?

DRILL WORK

• Write and add :

	a	b	c
1.	$ 2785.00	$ 5870.00	$ 475.00
	597.55	29.60	6000.00
	3000.00	587.25	459.06
	987.46	45.03	250.00
	6750.00	6540.20	4278.64
	5340.02	8750.00	5782.98
	9876.54	2346.59	8796.32
	3201.89	4567.83	4123.56
2.	$ 6004.50	$ 6550.00	$ 2987.35
	887.95	278.93	500.83
	504.06	8.10	6789.05
	2874.59	200.02	200.06
	850.00	7007.05	678.46
	2250.05	520.84	4586.23
	275.83	4265.63	2080.95
	7817.89	6005.80	2345.10
3.	$ 475.00	$ 1286.40	$ 7665.00
	6000.20	587.52	2050.50
	579.80	3873.20	2002.02
	1000.50	78.00	879.30
	457.39	759.06	698.09
	100.10	9300.00	5000.10
	4555.05	759.84	898.45
	7016.89	5234.18	4987.56

DRILL WORK

Subtract and test 5 problems in 1 minute.

	a	b	c	d
1.	$860.45	$874.61	$724.82	$870.62
	178.62	126.42	109.87	188.94
2.	$684.26	$962.41	$921.08	$700.64
	397.84	802.96	120.09	188.96
3.	$784.12	$908.07	$916.25	$864.30
	479.63	194.72	721.24	497.86
4.	$876.42	$900.40	$921.11	$422.33
	91.76	87.80	888.66	188.88
5.	$600.03	$744.44	$800.55	$111.21
	187.69	299.99	288.85	108.89
6.	$700.77	$644.41	$854.32	$765.43
	188.99	387.64	123.45	112.34
7.	$842.16	$964.21	$841.22	$742.24
	199.97	188.74	108.62	604.28
8.	$914.79	$305.00	$965.06	$821.00
	549.86	128.95	578.98	367.89

SIGHT DRILLS

Give products at sight:

	a	b	c	d	e	f	g	h
1.	12	8	8	9	6	10	8	11
	5	4	12	7	5	9	7	4
2.	11	6	5	7	5	4	8	8
	7	7	10	4	11	12	6	5
3.	11	12	6	4	9	6	12	9
	8	4	10	9	3	11	10	5
4.	13	13	14	15	15	12	10	12
	2	3	2	3	4	6	8	9
5.	12	7	12	5	5	15	13	15
	11	6	7	7	8	6	4	5
6.	20	25	12	12	9	20	50	60
	5	4	100	12	8	10	10	20
7.	5	7	8	10	11	9	6	12
	5	7	8	10	11	9	6	12

8. $\frac{1}{4}$ of 12; of 24; 36; 60; 72; 100.

9. 10×35; 10×52; 20×30; 20×40.

10. Give two factors that form: 18; 27; 42; 49; 72; 96.

SIGHT DRILLS

	a	b	c	d
1.	$24 \div 3$	$96 \div 12$	$44 \div 11$	$35 \div 7$
2.	$88 \div 11$	$60 \div 5$	$32 \div 8$	$33 \div 11$
3.	$22 \div 11$	$90 \div 10$	$72 \div 6$	$25 \div 5$
4.	$49 \div 7$	$81 \div 9$	$18 \div 2$	$66 \div 11$
5.	$24 \div 6$	$16 \div 2$	$24 \div 4$	$63 \div 7$
6.	$66 \div 6$	$27 \div 9$	$50 \div 10$	$48 \div 12$
7.	$70 \div 10$	$36 \div 4$	$20 \div 4$	$60 \div 12$
8.	$56 \div 7$	$96 \div 8$	$20 \div 2$	$20 \div 10$
9.	$72 \div 9$	$40 \div 5$	$56 \div 8$	$28 \div 7$
10.	$77 \div 7$	$36 \div 6$	$42 \div 7$	$30 \div 10$
11.	$24 \div 8$	$27 \div 3$	$24 \div 2$	$18 \div 9$
12.	$21 \div 3$	$50 \div 5$	$40 \div 8$	$99 \div 9$
13.	$54 \div 6$	$30 \div 6$	$108 \div 9$	$45 \div 9$
14.	$48 \div 6$	$35 \div 5$	$70 \div 7$	$80 \div 10$
15.	$36 \div 9$	$77 \div 11$	$63 \div 9$	$84 \div 12$
16.	$54 \div 9$	$12 \div 3$	$33 \div 3$	$32 \div 4$
17.	$64 \div 8$	$55 \div 5$	$72 \div 8$	$24 \div 12$
18.	$60 \div 6$	$84 \div 7$	$22 \div 11$	$99 \div 11$
19.	$90 \div 9$	$14 \div 2$	$80 \div 8$	$72 \div 12$
20.	$144 \div 12$	$121 \div 11$	$110 \div 10$	$132 \div 11$
21.	$110 \div 11$	$132 \div 12$	$120 \div 12$	$120 \div 10$

MULTIPLICATION TABLE

Review and memorize:

$1 \times 1 = 1$	$1 \times 2 = 2$	$1 \times 3 = 3$	$1 \times 4 = 4$
$2 \times 1 = 2$	$2 \times 2 = 4$	$2 \times 3 = 6$	$2 \times 4 = 8$
$3 \times 1 = 3$	$3 \times 2 = 6$	$3 \times 3 = 9$	$3 \times 4 = 12$
$4 \times 1 = 4$	$4 \times 2 = 8$	$4 \times 3 = 12$	$4 \times 4 = 16$
$5 \times 1 = 5$	$5 \times 2 = 10$	$5 \times 3 = 15$	$5 \times 4 = 20$
$6 \times 1 = 6$	$6 \times 2 = 12$	$6 \times 3 = 18$	$6 \times 4 = 24$
$7 \times 1 = 7$	$7 \times 2 = 14$	$7 \times 3 = 21$	$7 \times 4 = 28$
$8 \times 1 = 8$	$8 \times 2 = 16$	$8 \times 3 = 24$	$8 \times 4 = 32$
$9 \times 1 = 9$	$9 \times 2 = 18$	$9 \times 3 = 27$	$9 \times 4 = 36$
$10 \times 1 = 10$	$10 \times 2 = 20$	$10 \times 3 = 30$	$10 \times 4 = 40$
$11 \times 1 = 11$	$11 \times 2 = 22$	$11 \times 3 = 33$	$11 \times 4 = 44$
$12 \times 1 = 12$	$12 \times 2 = 24$	$12 \times 3 = 36$	$12 \times 4 = 48$
$1 \times 5 = 5$	$1 \times 6 = 6$	$1 \times 7 = 7$	$1 \times 8 = 8$
$2 \times 5 = 10$	$2 \times 6 = 12$	$2 \times 7 = 14$	$2 \times 8 = 16$
$3 \times 5 = 15$	$3 \times 6 = 18$	$3 \times 7 = 21$	$3 \times 8 = 24$
$4 \times 5 = 20$	$4 \times 6 = 24$	$4 \times 7 = 28$	$4 \times 8 = 32$
$5 \times 5 = 25$	$5 \times 6 = 30$	$5 \times 7 = 35$	$5 \times 8 = 40$
$6 \times 5 = 30$	$6 \times 6 = 36$	$6 \times 7 = 42$	$6 \times 8 = 48$
$7 \times 5 = 35$	$7 \times 6 = 42$	$7 \times 7 = 49$	$7 \times 8 = 56$
$8 \times 5 = 40$	$8 \times 6 = 48$	$8 \times 7 = 56$	$8 \times 8 = 64$
$9 \times 5 = 45$	$9 \times 6 = 54$	$9 \times 7 = 63$	$9 \times 8 = 72$
$10 \times 5 = 50$	$10 \times 6 = 60$	$10 \times 7 = 70$	$10 \times 8 = 80$
$11 \times 5 = 55$	$11 \times 6 = 66$	$11 \times 7 = 77$	$11 \times 8 = 88$
$12 \times 5 = 60$	$12 \times 6 = 72$	$12 \times 7 = 84$	$12 \times 8 = 96$
$1 \times 9 = 9$	$1 \times 10 = 10$	$1 \times 11 = 11$	$1 \times 12 = 12$
$2 \times 9 = 18$	$2 \times 10 = 20$	$2 \times 11 = 22$	$2 \times 12 = 24$
$3 \times 9 = 27$	$3 \times 10 = 30$	$3 \times 11 = 33$	$3 \times 12 = 36$
$4 \times 9 = 36$	$4 \times 10 = 40$	$4 \times 11 = 44$	$4 \times 12 = 48$
$5 \times 9 = 45$	$5 \times 10 = 50$	$5 \times 11 = 55$	$5 \times 12 = 60$
$6 \times 9 = 54$	$6 \times 10 = 60$	$6 \times 11 = 66$	$6 \times 12 = 72$
$7 \times 9 = 63$	$7 \times 10 = 70$	$7 \times 11 = 77$	$7 \times 12 = 84$
$8 \times 9 = 72$	$8 \times 10 = 80$	$8 \times 11 = 88$	$8 \times 12 = 96$
$9 \times 9 = 81$	$9 \times 10 = 90$	$9 \times 11 = 99$	$9 \times 12 = 108$
$10 \times 9 = 90$	$10 \times 10 = 100$	$10 \times 11 = 110$	$10 \times 12 = 120$
$11 \times 9 = 99$	$11 \times 10 = 110$	$11 \times 11 = 121$	$11 \times 12 = 132$
$12 \times 9 = 108$	$12 \times 10 = 120$	$12 \times 11 = 132$	$12 \times 12 = 144$

MULTIPLIERS ENDING IN NAUGHT

1. Annex a naught to the right of 3; then multiply 3 by 10. Is there any difference in the result?

Annexing a naught to the right of a number multiplies it by 10.

2. Multiply by 10: 40; 20; 60; 800; 300; 700; 900.

3. Multiply 3 by 100; 8 by 100; 9 by 100; 20 by 100. How many times greater has each of the numbers become? How many naughts were added to each?

Annexing two naughts to the right of a number multiplies it by 100.

4. Find:

100×4	100×15	100×50	100×75
100×7	100×95	100×85	100×12
100×5	100×37	100×91	100×36

5. What is the difference between 1000×3 and 3×1000? between 1000×6 and 6×1000? How many naughts were annexed to 3? to 6? How many times greater has each become?

Annexing three naughts to the right of a number multiplies it by 1000.

6. From what you have learned make a rule for multiplying any number by 10; 100; 1000; 10000.

7. Multiply:

8 by 1000; 7 by 1000; 9 by 1000; 4 by 1000; 13 by 1000; 12 by 10000; 14 by 1000; 19 by 1000; 25 by 100; 36 by 10; 95 by 100; 72 by 10; 72 by 10000.

1. How many cents are there in 100 dimes?

2. How many cents are there in $6?

Find the weight of:

3. 1000 two-pound packages of rolled oats.

4. 1000 five-pound boxes of starch.

5. 25 one hundred-pound kegs of nails.

6. 100 lambs at an average of 45 lb. each.

7. Find the cost of 1000 one-cent postal cards and 100 two-cent stamps.

8. Multiply 63 by 2000.

63	Write the 2 of the multiplier under the figure in ones' place of the multiplicand. 2 × 63 is
2000	126. Annex three naughts to the right of 126,
126000	making 126000. 1000 × 63 = 63000; 2000 × 63 = 126000.

Multiply, and read the product:

9. 71	10. 85	11. 245	12. 715
200	3000	4000	700

13. 347 by 20	18. 293 by 500	23. 481 by 2000
14. 409 by 30	19. 786 by 700	24. 894 by 4000
15. 715 by 60	20. 184 by 400	25. 906 by 7000
16. 329 by 80	21. 796 by 600	26. 728 by 9000
17. 475 by 90	22. 832 by 200	27. 365 by 1200

DIVISORS ENDING IN NAUGHT

1. Divide 60 by 10. Remove 0 from 60. 60 is how many times 6?

2. Compare 40 and 4; 30 and 3; 2×10 and $20 \div 10$. What effect has the removing of naught from the right of a number upon the value of the number?

3. Divide by 10: 20; 900; 350; 470; 530; 260; 740.

4. How many are 100×6? 100×9? $600 \div 100 = ?$ $900 \div 100 = ?$ How many naughts are removed from the right of 900 when it is divided by 100? from the right of 600? What effect has the removing of two naughts from the right of a number upon the value of the number?

5. Find 1000×9; 1000×3; $9000 \div 1000$; $3000 \div 1000$. How many naughts are removed from the right of 9000 when it is divided by 1000? from the right of 3000? What effect has the removing of three naughts from the right of a number upon the number?

Removing one naught from the right of a number divides the number by 10; *removing two naughts, divides it by* 100; *removing three naughts, divides it by* 1000, *etc.*

Find quotients:

6.	$30 \div 10$	**10.**	$300 \div 100$	**14.**	$4000 \div 100$
7.	$90 \div 10$	**11.**	$600 \div 100$	**15.**	$5000 \div 1000$
8.	$70 \div 10$	**12.**	$700 \div 100$	**16.**	$9000 \div 1000$
9.	$200 \div 10$	**13.**	$900 \div 100$	**17.**	$7000 \div 1000$

1. Divide 1460 by 20.

2$\emptyset$)1460$\emptyset$ Cutting off naught, or the same
  73   number of naughts, from *both dividend*
2$\emptyset\emptyset$)1460$\emptyset\emptyset$ *and divisor* does not change the quo-
  73   tient.

Find the quotients:

2.	$80 \div 20$	**6.**	$900 \div 100$	**10.**	$12000 \div 1000$
3.	$60 \div 30$	**7.**	$1000 \div 100$	**11.**	$12000 \div 2000$
4.	$90 \div 10$	**8.**	$6000 \div 200$	**12.**	$18000 \div 3000$
5.	$40 \div 20$	**9.**	$8400 \div 400$	**13.**	$16000 \div 4000$

14. How many 10-gallon cans will a dealer use in shipping 200 gallons of milk?

15. How many 20-lb. packages can be made from 1000 lb. of coffee?

16. 2000 pounds of crackers were shipped in 400 boxes. How many pounds did each box contain?

17. How many $20 coats must be sold to realize $2400?

18. A man bought a house for $3500. How many months will it take to pay for it at $100 a month?

Give quotients at sight:

19.	$160 \div 40$	**24.**	$200 \div 50$	**29.**	$750 \div 15$
20.	$360 \div 30$	**25.**	$480 \div 80$	**30.**	$300 \div 60$
21.	$900 \div 90$	**26.**	$480 \div 60$	**31.**	$250 \div 25$
22.	$750 \div 30$	**27.**	$220 \div 110$	**32.**	$600 \div 50$
23.	$850 \div 50$	**28.**	$240 \div 120$	**33.**	$700 \div 140$

MULTIPLICATION BY TWO–FIGURE NUMBERS

1. Multiply 64 by 23.

Multiplicand	64		64
Multiplier	23		23
1st partial product	$\overline{192} = 3 \times 64$		$\overline{192}$
2d partial product	$1280 = 20 \times 64$		128
Entire product	$\overline{1472} = \overline{23} \times 64$		$\overline{1472}$

In practice the 0 in the second partial product is omitted, and 1280 is written as 128 *tens* by placing the right-hand figure of that product in *tens'* place.

2.	**3.**	**4.**	**5.**
327	203	6004	3060
35	42	73	89
$\overline{1635}$	$\overline{406}$	$\overline{18012}$	$\overline{27540}$
981	812	42028	24480
$\overline{11445}$	$\overline{8526}$	$\overline{438292}$	$\overline{272340}$

Multiply:

	a	b	c	d	e
6.	63	645	863	765	806
	24	32	24	35	43
7.	98	346	609	963	863
	23	54	15	41	51
8.	604	861	867	763	867
	43	32	45	54	36

Multiply :

1. 426 by 23	**11.** 634 by 37	**21.** 9006 by 48
2. 372 by 41	**12.** 298 by 73	**22.** 2694 by 75
3. 256 by 33	**13.** 604 by 48	**23.** 8002 by 38
4. 307 by 32	**14.** 729 by 40	**24.** 4293 by 67
5. 269 by 43	**15.** 903 by 86	**25.** 9128 by 39
6. 307 by 27	**16.** 694 by 79	**26.** 2807 by 74
7. 538 by 36	**17.** 928 by 89	**27.** 6293 by 56
8. 736 by 63	**18.** 726 by 75	**28.** 4060 by 13
9. 487 by 52	**19.** 349 by 28	**29.** 2734 by 27
10. 994 by 35	**20.** 723 by 14	**30.** 4169 by 32

31. Announce products at sight :

50×90	90×70	20×80	70×60	70×40
80×70	60×50	40×30	30×30	90×90

$3 \times 3 = 9$; 9 is the **square** of 3. $6 \times 6 = 36$; 36 is the **square** of 6.

To find the **square** *of a number, we multiply it by itself.*

32. Find the squares and memorize :

2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25.

Multiply :

33. 463 by 73	**37.** 9869 by 84	**41.** 8693 by 28
34. 938 by 84	**38.** 3278 by 93	**42.** 9281 by 39
35. 697 by 95	**39.** 9009 by 49	**43.** 7375 by 47
36. 893 by 96	**40.** 6075 by 74	**44.** 4069 by 56

MULTIPLICATION OF CONCRETE NUMBERS

Which of the following numbers are *abstract?*   Which are *concrete?*   Why?

1. 8; 6 days; $4; 5¢; 25; 4 feet; 8 horses.

2. Name the *multiplier* and the *multiplicand* in each problem:

$8	64 days	81 horses	72 oranges
× 5	× 4	× 7	× 3

3. Observe in each of the above problems that the product must have the *same* name as the multiplicand. *The multiplier is always an abstract number.*

4. When two numbers are multiplied, the *number in the product* remains the same in whatever order the numbers are taken; thus: $7 \times 12 = 12 \times 7$.

5. How much do I earn in 125 days at $3 per day?

In problems like this where the multiplier has more figures than the multiplicand, the product of the numbers may be found thus: 125, but the analysis of the

$$\frac{3}{375}$$

problem should be given in this way:

> I earn in one day, $3.
> I earn in 125 days, 125 × $3, or $375.

Find the cost of: How many:

6. 319 days' work @ $3   **10.** Pints in 327 qt.?

7. 817 tons coal @ $5   **11.** Inches in 845 ft.?

8. 198 lb. meal @ 9¢   **12.** Pecks in 164 bu.?

9. 345 doz. buttons @ 8¢   **13.** Ounces in 375 lb.?

PRACTICAL PROBLEMS

Find the cost of:

1. 28 pounds of raisins   @   15 ¢.
2. 46½ gallons of vinegar   @   24 ¢.
3. 196 pounds of sugar   @   6 ¢.
4. 48⅓ pounds of butter   @   27 ¢.
5. 64½ pounds of meat   @   16 ¢.
6. 85 dozen oranges   @   35 ¢.
7. 27 gallons of molasses   @   48 ¢.
8. 58¼ bushels of potatoes @   60 ¢.
9. 25 dozen eggs   @   23 ¢.
10. 54 barrels of flour   @ $ 5.25.
11. 27 barrels of apples   @ $ 2.35.
12. 34 tons of coal   @ $ 6.75.
13. 148½ pounds of tea   @   56 ¢.
14. 144 dozen eggs   @   26 ¢.
15. 48 yards of cloth   @   87 ¢.
16. 36½ tons of hay   @ $16.70.

17. The frontage on a city street is 176 feet. How much is it worth at $ 65 a front foot?

18. A grocer sold 18 firkins of butter, each containing 56 pounds, at 24 ¢ a pound. How much did he receive for the butter?

19. A boy works 8 hours a day. How many hours does he work in 28¼ days?

STATEMENTS

Make problems from the following statements and bring solutions to the class:

1. Mr. Hall bought 26 acres of land at $26 an acre.

2. A man took 16 lb. of butter to the store and sold it at 25 ¢ a pound.   He took in payment shoes at $2.50.

3. A milkman has 25 customers.   Each receives 2 quarts of milk daily.

4. A boy bought 6 doz. bananas at 3 for 5 ¢ and sold them at 3 for a dime.

5. A newsboy sells 46 penny papers, on which he ·gains $\frac{1}{2}$ ¢ each.

6. A farmer bought 12 sheep at $6.50 each.

7. A dealer sold a suite of furniture for $72.75, losing $10.50.

8. 30 boys have an average of $1.65.

9. A fruit dealer bought 2 crates of berries, each containing 32 quarts, at 7 ¢ a quart.

10. William sold $\frac{1}{2}$ of a bushel of plums at 8 ¢ a quart.

11. A man had $26.75 and spent $13.89.

12. A milliner sold 6 hats at $4.75 each.

13. John attended 163 days of the 200 school days.

14. 15 yards were sold from a piece of cloth containing 68 yards.

15. The "Limited" left New York at 10:40 P.M. and ran at the rate of 45 miles an hour.

COMPARISON

In the following comparisons the first number is to be divided by the second:

1. Compare 12 and 4; 12 and 3; 16 and 4.

2. Compare 5 and 15.

3. Compare:

18 and 6	16 and 4	6 and 12.
20 and 5	45 and 9	6 and 30.

4. When 3 oranges cost 10 cents, how much will 12 oranges cost?

NOTE.—12 oranges equal 4 × 3 oranges; hence they will cost 4 × 10 cents, or 40 cents.

5. At 6 melons for 25 cents, how much will 24 cost?

6. At 12 lemons for 15 cents, how much will 72 cost?

7. If 8 tons of coal cost $54, how much will 40 tons cost?

8. If 3 collars cost 35 cents, how much will 24 collars cost?

9. When 12 cords of wood cost $48, how much will 3 cords cost?

10. How much will 4 qt. of milk cost when 16 qt. cost $1.28?

11. When 7 tons of hay sell for $91, how much will a farmer receive for 35 tons?

12. If 96 acres of land are worth $2592, how much are 12 acres worth?

REVIEW OF SHORT DIVISION

Answer at sight:

1. $2\overline{)32}$ $3\overline{)48}$ $4\overline{)44}$ $5\overline{)35}$ $5\overline{)75}$

2. $6\overline{)72}$ $7\overline{)147}$ $8\overline{)872}$ $9\overline{)3699}$ $8\overline{)4056}$

Give answers quickly:

3. $\frac{1}{2}$ of 16;   18;   26;   28;   32;   36;   40.
4. $\frac{1}{3}$ of 24;   27;   36;   18;   60;   90;   120.
5. $\frac{1}{4}$ of 48;   24;   60;   72;   36;   44;   56.
6. $\frac{1}{5}$ of 60;   55; 100; 150;   75;   45;   65.
7. $\frac{1}{6}$ of 72;   96;   84;   24;   48; 240;   36.
8. $\frac{1}{7}$ of 84;   91;   49;   63; 105; 350; 2100.
9. $\frac{1}{8}$ of 96;   72; 640; 960; 560; 120; 880.
10. $\frac{1}{9}$ of 108; 135; 360;. 720;   54; 7209; 1080.
11. $\frac{1}{10}$ of 100; 120; 130; 190; 1250; 1950; 1780.
12. $\frac{1}{11}$ of 132;   88;   99;   77; 1100; 1320; 1210.
13. $\frac{1}{12}$ of 144; 288;   96;   84; 960; 840; 1080.

Divide and test:

14. $11\overline{)6303}$ $11\overline{)2244}$ $11\overline{)2882}$ $11\overline{)6699}$

15. $12\overline{)96840}$ $12\overline{)89640}$ $12\overline{)6072}$ $12\overline{)9060}$

Give quotients at sight:

16. $8\overline{)96}$ $9\overline{)72}$ $10\overline{)190}$ $11\overline{)121}$ $12\overline{)96}$

LONG DIVISION

1. Divide 240 by 15.

```
        16 Quotient.
Divisor 15)240 Dividend.
        15
        ——
        90
        90
        ——
         0
```

In long division the quotient is placed *over* the dividend. 15 is contained in 24, 1 time. Write the 1 in the quotient over the 4. Multiply 15 by 1, placing the product, 15, under 24. Subtract 15 from 24. The remainder is 9. Bring down the next figure, 0. 15 is contained in 90, 6 times. Multiply 15 by 6, placing the product, 90, under 90. As there is no remainder, the quotient is 16.

Divide:

```
        21 Ans.            23 Ans.                209 Ans.
2. 13)273         3. 14)322             4. 25)5225
     26                 28                     50
     ——                 ——                     ——
     13                 42                     225
     13                 42                     225
```

5. How many times is 21 contained in 504 ?

```
     24
21)504
   42
   ——
   84
   84
```

STEPS :

1. Divide 50 by 21.
2. Write quotient figure.
3. Multiply 21 by 2.
4. Subtract 42 from 50.
5. Bring down next figure.

Test. — 24 × 21 = 504.

6. Divide 441 by 21; 672 by 21; 903 by 21.

FINDING THE QUOTIENT FIGURE IN DIVISION

Think how many times the first figure of the divisor is contained in the first figure of the dividend. The number will be the first figure of the quotient.

1. $252 \div 21$	**4.** $714 \div 21$	**7.** $504 \div 21$
2. $525 \div 21$	**5.** $651 \div 21$	**8.** $2398 \div 21$
3. $861 \div 21$	**6.** $357 \div 21$	**9.** $2625 \div 21$

Think how many times the first figure of the divisor is contained in the first figure, or in the first two figures, of the dividend. The number will be the first figure of the quotient.

10. $713 \div 31$	**14.** $7061 \div 23$	**18.** $6831 \div 33$
11. $899 \div 31$	**15.** $9269 \div 23$	**19.** $1984 \div 32$
12. $6727 \div 31$	**16.** $5028 \div 42$	**20.** $2272 \div 32$
13. $8323 \div 41$	**17.** $1344 \div 42$	**21.** $1683 \div 51$

22. Divide 819 by 21.

$$\begin{array}{r} 4 \\ 21\overline{)819} \\ 84 \\ \hline \end{array}$$

Since the product of the divisor and quotient is greater than 81, the quotient figure is *too large*. Try a smaller quotient figure.

$$\begin{array}{r} 39 \\ 21\overline{)819} \\ 63 \\ \hline 189 \\ 189 \\ \hline \end{array}$$

23. Divide 651 by 21.

$$\begin{array}{r} 2 \\ 21\overline{)651} \\ 42 \\ \hline 23 \end{array}$$

Since the remainder is greater than the divisor, the quotient figure is *too small*. Try a larger quotient figure.

$$\begin{array}{r} 31 \\ 21\overline{)651} \\ 63 \\ \hline 21 \\ 21 \\ \hline \end{array}$$

Divide and test:

1. 21)882	**13.** 23)575	**25.** 33)462	**37.** 43)1333
2. 21)903	**14.** 23)736	**26.** 33)858	**38.** 43)6880
3. 21)504	**15.** 23)966	**27.** 33)561	**39.** 43)9460
4. 21)819	**16.** 23)138	**28.** 33)627	**40.** 43)1376
5. 21)315	**17.** 31)775	**29.** 41)943	**41.** 51)1683
6. 21)567	**18.** 31)744	**30.** 41)2296	**42.** 51)3672
7. 21)399	**19.** 31)899	**31.** 41)1107	**43.** 51)3264
8. 21)441	**20.** 31)217	**32.** 41)1435	**44.** 51)1428
9. 22)814	**21.** 32)672	**33.** 42)1008	**45.** 52)1508
10. 22)638	**22.** 32)928	**34.** 42)1596	**46.** 52)2288
11. 22)352	**23.** 32)160	**35.** 42)1680	**47.** 53)2385
12. 22)660	**24.** 32)192	**36.** 42)1722	**48.** 53)1908

49. A butcher paid $1476 for 41 head of cattle. How much was that per head?

50. If a railroad trackman walks 16 miles each day, how long will he be in walking 832 miles?

51. If there are 496 ounces in 31 pounds, how many ounces are there in 1 pound?

52. If 24 barrels of oil cost $44.40, what is the price of 1 barrel?

53. If a bushel of oats weighs 32 lb., how many bushels will weigh 28640 lb.?

54. How long will it take a train that travels 35 miles an hour to go a distance of 315 miles?

55. At 38 ¢ a word, how many words can I cable from New York to Sweden for $3.04?

LONG DIVISION

1. Divide 7416 by 25.

$$296\tfrac{16}{25} \text{ Quotient}$$
$$25\overline{)7416}$$
$$\underline{50}$$
$$\overline{241}$$
$$.\,\underline{225}$$
$$\overline{166}$$
$$\underline{150}$$
$$\overline{16} \text{ remainder} \div 25 = \tfrac{16}{25}.$$

Write the remainder over the divisor, and annex it to the right of the quotient.

Test. — 296 × 25 = 7400; 7400 + 16 = 7416.

Divide and test:

2. 2397 by 51	**13.** 1281 by 21	**24.** 6938 by 94
3. 3888 by 86	**14.** 1703 by 27	**25.** 7159 by 39
4. 1302 by 21	**15.** 3034 by 46	**26.** 8697 by 28
5. 2945 by 38	**16.** 4697 by 61	**27.** 4910 by 45
6. 3213 by 51	**17.** 4368 by 98	**28.** 3682 by 73
7. 1827 by 27	**18.** 4544 by 76	**29.** 4918 by 94
8. 3007 by 36	**19.** 2867 by 61	**30.** 8168 by 86
9. 6256 by 81	**20.** 2058 by 27	**31.** 7369 by 69
10. 5096 by 95	**21.** 2668 by 31	**32.** 8925 by 28
11. 2542 by 41	**22.** 3592 by 43	**33.** 8610 by 65
12. 3567 by 87	**23.** 2047 by 83	**34.** 9102 by 98

35. How many suits, at $32 each, can be bought for $1095, and what amount will be left?

36. Find the number of barrels of oil, 51 gallons each, that can be filled from a vessel containing 408 gallons.

PRACTICAL PROBLEMS

1. At $.25 each, how many books can you buy for $6.25?

$$\$ 6.25 = 625\cent \qquad \$.25 = 25\cent$$

Cost of 1 book $25\cent)\overline{625\cent}$, money spent.
$$\begin{array}{r} 25 \text{ No. of books.} \\ \hline 50 \\ \hline 125 \\ 125 \end{array}$$

2. At 16 cents each, how many belts can be bought for $4.80?

3. Mary paid 24 cents a pound for butter. The amount of her bill was $3.12. How many pounds did she buy?

4. How many gallons equal 652 quarts?

5. I bought silk at 75 cents a yard and paid $13.50. How many yards did I buy?

6. In how many months will a man save $1120, if he saves $32 a month? in how many years?

7. How many bars of iron, weighing 56 lb. each, are equal in weight to a bar weighing 18200 lb.?

8. A man sold land for $45 an acre, receiving $7200 for it. How many acres did he sell?

9. An orchard contains 4032 trees, planted in 32 rows. How many trees are there in a row?

10. A farm of 174 acres was sold for $12970. What was the selling price per acre?

DIVISION AND PARTITION

Division is the process of finding how many times one number contains another, or of separating a number into equal parts.

1. How many times is $ 3 contained in $ 15 ?

This problem gives the *size* of the equal parts ($ 3) into which the dividend ($ 15) is to be divided, and asks for the *number* of equal parts. $ 15 ÷ $ 3 = 5, the *number* of equal parts.

2. What is the quotient of $15 divided by 3 ?

This problem gives the *number* of equal parts (3) into which the dividend ($ 15) is to be divided, and asks for the *size* of each part. $\frac{1}{3}$ of $ 15 = $ 5, the *size* of each part. This kind of division is called **partition**.

First state whether each problem calls for the *number* of equal parts or the *size* of each part, and then give answers :

3. 144 in. ÷ 12 in.   **7.** 192 bu. ÷ 16 bu.

4. 125 yd. ÷ 5   **8.** 108 in. ÷ 9

5. $ 132 ÷ $ 11   **9.** $\frac{1}{10}$ of $ 250

6. 150 ft. ÷ 10   **10.** $\frac{1}{8}$ of 128 da.

11. At 45¢ a bushel, how many bushels of corn will sell for $ 17.55 ?

12. If 28 Stanhope buggies are sold for $ 2912, what is the average price ?

13. If a train runs 1036 miles in 37 hours, how far will it run in one hour ?

LONG DIVISION

1. Divide 13892 by 23.

```
       604
23)13892
     138
     ___
       92
       92
       __
```

What is the product of **6 × 23**? Is there any remainder? What is the next operation? Does 9 contain 23? Since 9 does not contain 23, write 0 in the quotient, and bring down 2, making the number to be divided 92.

Find quotients and test:

2. 26322 ÷ 46	**9.** 23229 ÷ 29	**16.** 56079 ÷ 73
3. 31356 ÷ 39	**10.** 73784 ÷ 92	**17.** 45825 ÷ 65
4. 23641 ÷ 47	**11.** 15631 ÷ 77	**18.** 19844 ÷ 49
5. 33522 ÷ 37	**12.** 36792 ÷ 73	**19.** 19266 ÷ 38
6. 31590 ÷ 45	**13.** 58056 ÷ 82	**20.** 83396 ÷ 98
7. 49248 ÷ 81	**14.** 67596 ÷ 74	**21.** 41157 ÷ 51
8. 20130 ÷ 66	**15.** 16685 ÷ 54	**22.** 15100 ÷ 25

Give quotients at sight:

23. 64 ÷ 32	**30.** 200 ÷ 20	**37.** 90 ÷ 45
24. 96 ÷ 48	**31.** 70 ÷ 35	**38.** 60 ÷ 20
25. 40 ÷ 20	**32.** 45 ÷ 15	**39.** 48 ÷ 24
26. 50 ÷ 25	**33.** 46 ÷ 23	**40.** 56 ÷ 28
27. 60 ÷ 30	**34.** 556 ÷ 28	**41.** 63 ÷ 21
28. 90 ÷ 45	**35.** 99 ÷ 33	**42.** 84 ÷ 21
29. 100 ÷ 50	**36.** 64 ÷ 32	**43.** 62 ÷ 31

SIGHT WORK IN MULTIPLICATION AND DIVISION

These problems should be worked by writing the answers directly, without placing the multiplier under the multiplicand.

Find the cost of:

1. 3 houses @ $2500.
2. 750 bu. coal @ 8¢.
3. 60 hats @ $1.25.
4. 1 doz. chairs @ $2.50.
5. 25 suits @ $10.
6. 6 gal. oil @ $.60.
7. 8 gal. varnish @ $1.25.
8. 150 yd. cloth @ $.30.
9. 12 lb. butter @ 25¢.
10. 25 doz. eggs @ 25¢.
11. 11 doz. lemons @ 30¢.
12. 15 pails of lard @ 40¢.
13. 3 gal. maple sirup @ $1.25.
14. 3 hams @ $2.75.

Give products at sight:

15. $4 \times 30 =$
16. $10 \times 10 =$
17. $2 \times 25 =$
18. $5 \times 50 =$
19. $6 \times 60 =$
20. $8 \times 90 =$
21. $12 \times 50 =$
22. $11 \times 30 =$
23. $9 \times 25 =$
24. $10 \times 35 =$
25. $12 \times 12 =$
26. $12 \times 40 =$
27. $12 \times 15 =$
28. $12 \times 45 =$

Find the cost of 1 when:

29. 9 bbl. flour cost $54.
30. 12 doz. oranges cost $3.
31. 8 coats cost $48.
32. 4 sheep cost $22.
33. 15 lb. butter cost $3.

Give quotients at sight:

34. $360 \div 9 =$
35. $328 \div 8 =$
36. $455 \div 7 =$
37. $156 \div 12 =$
38. $121 \div 11 =$

REVIEW

Find the cost of: Add:

1. 13½ lb. of butter at 25¢ a lb.   **24.** $ 463.75
2. 64 suits at $8¼ each.   695.42
3. 32 pairs of shoes at $2 a pair.   1937.86
4. 400 lb. of sugar at 4¢ a pound.   947.75
5. 36 overcoats at $13.25 each.   678.93
6. 3000 envelopes at $12 a thousand.   **25.** $6937.85
7. 172 yards of cloth at 87¢ a yard.   596.27
8. 2500 lb. of coffee at 20¢ a pound.   8346.39
9. 128 hogs at $16¼ each.   326.42
10. 37 hats at $2.25 each.   2186.75
11. 45½ yards of silk at 80¢ a yard.   495.38
12. 1 gross pencils at 60¢ a dozen.   **26.** $9612.73
13. 32 cows at $32 each.   693.85
14. 125 tons of hay at $14.75 a ton.   2928.46
15. 72 bbl. of flour at $5.25 a barrel.   478.74
16. 14 bolts of ribbon at 75¢ a bolt.   8569.93
17. 78 bu. of wheat at 87¢ a bushel.   195.84
18. 47½ bu. of oats at 40¢ a bushel.   **27.** $3762.95
19. 25 bu. of corn at 50¢ a bushel.   661.43
20. 25 lb. of meat at 25¢ a pound.   99.87
21. 2½ doz. pairs of gloves at $1 a pair.   875.67
22. 36½ yd. of cloth at 18¢ a yard.   989.86
23. 2 gross penholders at 50¢ a dozen.   4987.19

PRACTICAL WORK

MARKET REPORT

Potatoes, 75¢ per bu.   Corn, 45¢ per bu.
Beans, $1.25 per bu.   Baked beans, 95¢ per doz. cans.
Butter,   Print, 33¢ per lb. Celery, 25¢ per doz.
           Dairy, 25¢ per lb. Eggplant, 75¢ per doz.
Sugar, 100 lb. bag, $5.50.   Watercress, 40¢ per doz.
Flour, per bbl., $5.80.   Blackberries, per crate, $3.20.

From the market report find the cost of each of the
following :

1. 7 bu. potatoes.   7. 8 bu. corn.

2. 15 lb. print butter.   8. 10 bags sugar.

3. 12 doz. celery.   9. 25 bbl. flour.

4. 25 doz. watercress.   10. 2 doz. cans baked beans.

5. 5 bu. beans.   11. 7 doz. eggplant.

6. 12 lb. dairy butter.   12. 3 crates blackberries.

At $12\frac{1}{2}$ ¢ each find the cost of :

13. 72 lb. of meat.   18. 176 cards of buttons.

14. 144 books.   19. 272 pecks of potatoes.

15. 64 vases.   20. 128 baskets of tomatoes.

16. 168 cups.   21. 96 watermelons.

17. 256 yd. of lawn.   22. 152 yd. of ribbon.

23. If it is 8 miles from A to B, and $4\frac{1}{2}$ times as far
from B to C, how far is it from A to C ?

24. James bought 10 lb. of sugar at $5\frac{1}{2}$ cents a pound ;
$4\frac{1}{2}$ lb. of butter at 20 cents a pound ; 6 lemons at 3 for
5 cents ; and two 8-cent loaves of bread. He gave the gro-
cer a two-dollar bill.   How much change did he receive?

PRACTICAL WORK

1. The ledger of a supply house shows the following for the sales of 5 different articles for a week. What was the amount of sales for each day? the amount received for each article? the amount of sales for the week?

	MON.	TUES.	WED.	THURS.	FRI.	SAT.
Pipe	$75.28	$39.46	$ 23.44	$39.75	$18.64	$ 75.75
Wire rope	18.94	67.25	143.40	91.18	9.75	125.30
Oil cans	8.41	52.13	9.16	6.95	15.85	23.80
Nails	24.95	86.30	275.50	64.86	82.95	16.75
Files	5.70	19.83	63.27	8.19	46.35	19.85

2. I can buy a box of 40 cakes of soap for $2.40, or the same soap at 2 cakes for 15 cents. Which is the cheaper, and how much per cake?

3. In buying 2 doz. cans of cherries, how much is gained by purchasing at $2.40 a dozen instead of buying 3 cans for 75 cents?

4. How much is gained by buying a barrel (196 lb.) of flour for $7.75 instead of buying the same amount at 5¢ a pound?

5. A man paid $275 for a lot. He built a house on it at 4 times the price of the lot, and spent $26 for shade trees, $31 for a fence, and $19.50 for a cement walk. He sold the property for $2000. How much did he gain?

6. How much will be received for 3 bu. of chestnuts at $12\frac{1}{2}$ ¢ a quart?

PRACTICAL PROBLEMS

1. A farmer has 28 cows in three fields. If there are 12 in the first, and 9 in the second, how many cows are there in the third field?

2. The farmer values his cows at an average of $ 35 each. What is the value of all?

3. The fields over which they graze contain 24 acres, 18 acres, and 14 acres. How much grazing land is there, and what is the value of this land at $ 35½ an acre?

4. If the farmer receives 21560 gallons of milk a year, how much is it worth at 12 cents a gallon?

5. His Jersey cow yields 350 lb. of butter a year, which he sells at 28 cents a pound. How much does he receive for it?

6. He sold 5 of the cows at an average price of $ 48.50. How much did he receive for them?

7. He keeps 2 men at $ 22½ a month, to work on the farm. How much does the labor for the year cost?

8. He sold 14 calves for $ 98. How much did he receive, on an average, for each?

9. His grocery bill averaged $ 36¼ per month. Find his bill for the year.

10. He purchased 2 horses, one at $ 125, and one at $ 150; and 2 wagons at $ 85 each. Repairs on the farm cost $ 87.50. Find the amount paid.

11. He bought 1½ doz. milk cans at $1.25 each. How much did they cost?

MEASURES OF TIME

1. Write the days of the week and the months of the year, with their abbreviations.

2. Observe that the **second hand** moves over 60 small or second spaces, while the minute hand moves over one minute space.
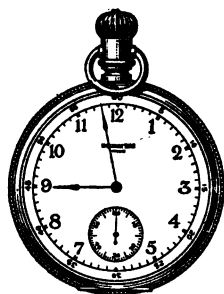
3. Memorize this table:

```
60 seconds (sec.) = 1 minute (min.)
60 minutes = 1 hour (hr.)
24 hours = 1 day (da.)
365 days = 1 year (yr.)
```

September, November, April, and June have each 30 days. All the others except February have 31 days each. February usually has 28 days. A year that has 366 days is called a **leap year**. In leap year February has 29 days.

4. Memorize this rhyme:

Thirty days have September,
April, June, and November.
All the rest have thirty-one,
Save February, which alone
Has twenty-eight; and one day more
We add to it one year in four.

Change:

5. 3 min. to sec.

6. 6 da. to hours.

7. 7 hr. to minutes.

8. 3 da. 6 hr. to hr.

9. 10 wk. 6 da. to da.

10. How many days are there in April, May, and June? in November, December, and January?

MEASURES OF WEIGHT

1. Name some articles bought by the **ounce** (**oz.**); by the **pound**.

2. How many ounces are there in 1 pound? in 10 pounds?

Coal, hay, sand, plaster, etc., in large quantities, are sold by the **ton** of 2000 **pounds.**

3. Memorize the table:

16 oz. = 1 pound (lb.)
2000 pounds = 1 ton (T.)

4. A dealer buys 150 bales of hay, averaging 90 pounds to the bale. How many tons and pounds over does he buy?

5. At 3 cents an ounce, how much will 1 pound of mustard cost?

6. Find the cost of six kegs of nails, each keg weighing 100 lb., at $5\frac{1}{2}$ cents a pound.

7. 2 tons of rolled oats were packed in pound packages. How many packages were there?

8. How many ounces are there in a ton?

9. A load of hay weighed 3000 pounds. How many tons did it weigh? What was its value at $14 a ton?

MEASURES OF LENGTH OR DISTANCE

1. Name the measures that you have already learned.

2. A foot = —— inches.

3. A yard = —— feet.

4. What measure should you use to measure the length of your book ? of your desk ? the width of your schoolroom ? the length of the blackboard ?

5. Measure $5\frac{1}{2}$ yards or $16\frac{1}{2}$ feet along the street or on the school ground.   Call it **one rod**.

6. Secure a tape measure $5\frac{1}{2}$ yards long, and with it measure the length and the width of your school grounds in yards and feet.

7. With a pole or a tape, a rod in length, measure the distance in rods and feet around a square or a field.

8. 20 city blocks, each 16 rods in length, are 320 rods long.   This is called **one mile**.   1 mile = 320 rods.

9. $320 \times 16\frac{1}{2}$ ft. = —— feet.   (Why do we multiply $16\frac{1}{2}$ ft. by 320 ?)

10. 5280 ft. ÷ 3 = —— yards.   (Why do we divide 5280 ft. by 3 ?)

11. Memorize this table :

12 inches (in.)	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
$5\frac{1}{2}$ yards, or $16\frac{1}{2}$ feet	= 1 rod (rd.)
320 rods	= 1 mile (mi.)
1760 yards = 1 mile	5280 feet = 1 mile

MEASURES OF LENGTH OR DISTANCE

Change:

1. 60 ft. to yd.
2. 27 rd. to ft.
3. 16 ft. to in.
4. 42 in. to ft.
5. 320 rd. to ft.
6. 1760 yd. to ft.
7. 5 ft. to in.
8. 120 in. to ft.
9. 72 ft. to yd.
10. 420 in. to ft.
11. 1250 yd. to ft.
12. 120 rd. to ft.

13. How many feet of fence are required for a garden in the form of an oblong 26 yards long and 12 yards wide?

14. James lives 180 rods from the schoolhouse. How many feet does he travel in going to and coming from school each day?

15. A boy travels 135 yards each day in carrying the mail. How many yards does he travel in 6 days? How' much less than a mile does he travel?

MEASURES OF SURFACE

1. Draw a square inch. What two things show that it is a *square* inch?

2. Draw on the blackboard one square foot. What two things show that it is a *square* foot?

3. Separate each side of a square foot into 12 equal parts. Connect these points by straight lines. What is the size of each square? the name of each square? How many square inches equal one square foot?

> **144 square inches = 1 square foot**

4. Draw on the blackboard a square yard. What two things show that it is a *square* yard?

Let one inch represent a foot. How long, then, is the side of the square that represents a square yard?

5. Represent a square yard by a square, each side of which is $\frac{3}{4}$ inch. Then, $\frac{1}{4}$ inch represents 1 foot. How long is each side of a square yard? Measure the surface of the square yard by 1 square foot. How many square feet are there in the upper row? in the second row? in the three rows?
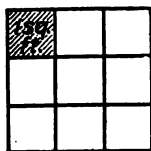
> **9 sq. ft. = 1 sq. yd.**

6. This drawing represents an oblong 4 yards long and 2 yards wide. Measure the surface by 1 square yard. How many square yards are in one row? in both rows?
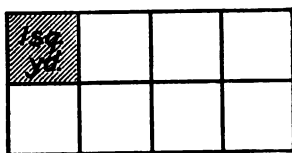
In 1 row there are 4 sq. yd.

In 2 rows there are 2 × 4 sq. yd. or 8 square yards.

7. How many square yards are there in an oblong 5 yd. long and 4 yd. wide?

The number of square inches, square feet, or square yards a surface contains is called its **area**.

MEASURES OF SURFACE

Find the area in square inches of:

1. An oblong 6 in. by 4 in.   5. An 8-in. square.

2. A square 7 in. on each side. 6. A 12-in. square.

3. A page 8 in. by 5 in.   7. A 9-in. square.

4. A slate 10 in. by 12 in.   8. A 10-in. square.

9. Draw a figure to represent an oblong 5 in. long and 3 in. wide. 'Find its area. Find the distance around the oblong.

The distance around a figure is called the **perimeter**.

10. Find the perimeter, in inches, of each figure described in problems 1 to 9.

Represent the following figures by a scale of 1 inch to the foot, and find the area and the perimeter:

11. A 6-ft. square.   13. A wall 9 ft. by 6 ft.

12. A rug 9 ft. by 4 ft.   14. A table 6 ft. by 5 ft.

Find the area and the perimeter.   Represent on a scale of 1 inch to a yard:

15. A schoolroom 10 yd. long and 8 yd. wide.

16. A hall 15 yd. long and 3 yd. wide.

17. A sidewalk 12 yd. long and 2 yd. wide.

18. Matting for a room 5 yd. long and 4 yd. wide.

19. Measure, in even yards, the length and width of your schoolroom floor, and draw the figure on a scale of 1 in. to the yard; 1 in. to the foot.

READING AND WRITING NUMBERS

1. How are large numbers pointed off before being read?

2. Name the periods of numbers up to millions.

3. Read 2,028,375. Notice that. in reading a number the units' period is not named. Thus this number is read 2 *million,* 28 *thousand,* 375; *not* 375 *units.*

The next period after millions is called **billions' period.** Copy, point off, and read:

	a	*b*	*c*	*d*
4.	2405	30670	6800907	8645742689
5.	3065	49007	400745	750680009
6.	7005	40074	8790007	406009807
7.	8900	87090	4057042	6804704924
8.	6666	90703	3012890	9000000250
9.	3050	65002	7000002	8057000000
10.	9580	73200	9050601	5700809563

Write:

11. Six thousand six hundred six.

12. Two billion ten million four.

13. Seventy-five thousand nine hundred six.

14. One billion eight million seventy-five.

15. Eighty-four million six hundred five thousand.

16. Twenty-five thousand thirty-eight.

17. Nine hundred million nine hundred ninety-nine.

18. Two million six thousand thirty.

19. One billion one million one thousand.

REVIEW

1. Begin with 9 and count by 9's to 126.

2. Begin with 1 and count by 9's to 118.

Add by columns and by lines:

a	b	c		d	e	f
3. $42 + 74 + 39 =$			**8.** $24 + 32 + 65 =$		
4. $36 + 93 + 61 =$			**9.** $39 + 86 + 92 =$		
5. $27 + 81 + 87 =$			**10.** $94 + 39 + 19 =$		
6. $49 + 64 + 49 =$			**11.** $28 + 76 + 85 =$		
7. $38 + 72 + 86 =$			**12.** $63 + 15 + 84 =$		
$+ \quad + \quad =$			$+ \quad + \quad =$		

	a	b	c	d
13.	$\$42.35 +$	$\$24.63 +$	$\$36.74 +$	$\$82.95 =$
14.	$18.69 +$	$32.78 +$	$6.27 +$	$2.39 =$
15.	$2.41 +$	$41.65 +$	$.96 +$	$49.85 =$
16.	$36.74 +$	$59.83 +$	$18.49 +$	$13.74 =$
17.	$83.89 +$	$43.62 +$	$9.37 +$	$26.48 =$
	$+$	$+$	$+$	$=$

	a	b	c	d
18.	$\$57.35 +$	$\$75.15 +$	$\$72.26 +$	$\$275.25 =$
19.	$63.27 +$	$64.23 +$	$17.83 +$	$375.65 =$
20.	$54.86 +$	$81.37 +$	$27.64 +$	$825.45 =$
21.	$83.74 +$	$76.45 +$	$36.21 +$	$963.75 =$
22.	$83.64 +$	$22.68 +$	$73.56 +$	$856.87 =$
	$+$	$+$	$+$	$=$

23. From the numbers at the right representing the daily circulation of a paper, find its circulation for July.

23.
2.	2134
3.	2124
4.	2110
5.	2124
6.	2124
7.	2064
9.	2123
10.	2128
11.	2124
12.	2109
13.	2114
14.	2063
16.	2110
17.	2124
18.	2124
19.	2124
20.	2124
21.	2062
23.	2128
24.	2124
25.	2124
26.	2124
27.	2124
28.	2058
30.	2120
31.	2127

BANK DEPOSITS

A bank is an institution that receives and loans money.

1. A bank received deposits as follows:

Monday, $4126.50;
Tuesday, $2842.35;
Wednesday, $5045.60;
Thursday, $3862.41;
Friday, $6065.70;
Saturday, $7564.72.

Find the total deposits for the week.

2. It paid out during the week $24862.43. How much more was received than was paid out?

3. On June 1, F. G. Bishoff had a balance on hand of $4232.44. During the month he deposited $1642.80, and checked on his account to the amount of $2214.60. What was his balance in bank July 1?

Find the balances:

	DEPOSITS	PAYMENTS		DEPOSITS	PAYMENTS
4.	$216443.62	$111861.74	**5.**	$15419.21	$14000.00
	112384.76	210987.65		16987.91	9044.89
	211129.82	2940.74		6456.75	1055.20
	114781.64	172.67		14381.50	10105.00
	122046.95	127642.94		3102.62	2056.98
	336847.68	1654.87		10000.00	8401.40

REVIEW OF ADDITION

Add (when written) 4 problems in $1\frac{1}{2}$ minutes:

	a	b	c	d
1.	$751.04	$146.80	$345.75	$187.90
	690.20	12.96	187.60	64.72
	404.72	842.90	962.45	124.87
	812.42	950.45	878.72	671.82
	900.25	2.75	964.54	48.96
	10.48	24.87	12.68	702.84
2.	$964.77	$420.41	$862.41	$864.12
	844.76	703.45	742.87	246.98
	99.75	802.60	368.23	107.64
	184.65	12.87	467.28	963.66
	209.87	908.72	643.82	478.23
	84.72	885.88	782.95	682.87
	104.88	225.12	328.15	478.24
	84.91	380.96	841.62	332.85
3.	$844.62	$10642.83	$321.62	$12891.42
	256.48	469.27	41.68	117.68
	741.87	184.64	769.62	49.64
	369.73	926.48	186.47	961.41
	108.42	12.93	524.93	87.83
	957.68	193.67	834.71	113.22
	87.64	446.72	221.34	487.64
	123.96	689.38	455.26	923.06

REVIEW OF SUBTRACTION

Write, subtract, and test 4 problems in $2\frac{1}{2}$ minutes:

	a	b	c	d
1.	$ 843.87	$ 376.47	$ 48892.00	$ 2498.73
	632.17	248.02	15079.63	519.71
2.	$ 600.01	$ 246.91	$ 32171.19	$ 7739.82
	289.81	19.17	16593.40	7015.09
3.	$ 940.09	$ 1497.63	$ 45269.79	$ 9999.86
	16.41	900.75	27319.27	1305.17
4.	$ 632.25	$ 741.20	$ 37461.27	$ 5020.37
	245.19	523.18	19842.07	2456.78
5.	$ 95.33	$ 61.05	$ 649.08	$ 27004.49
	49.27	37.97	500.16	19017.63
6.	$ 82.36	$ 79.87	$ 532.98	$ 75009.75
	19.36	27.93	403.61	69135.92
7.	$ 80.16	$ 65.32	$ 763.55	$ 97382.99
	25.31	13.27	300.01	39853.75
8.	$ 67.35	$ 51.27	$ 983.27	$ 32148.91
	59.32	27.75	742.19	14269.90
9	$ 90.00	$ 86.95	$ 836.92	$ 33197.84
	37.17	14.75	775.48	19057.55

DRILL IN MULTIPLICATION

1. Give products at sight:

8×4	7×8	6×6	12×8
3×9	9×6	7×6	11×9
4×7	7×9	11×5	12×7
6×5	8×8	8×6	9×8

	a	b	c	d	e	f	g
2.	12	9	8	12	11	9	4
	6	10	11	5	3	5	8
3.	11	8	7	11	10	12	7
	6	7	8	7	5	4	6
4.	12	11	12	9	12	11	12
	8	11	11	12	10	11	12

5. Give at sight two factors that form:

64	84	81	72	77	108
72	99	33	96	63	121
49	36	54	84	66	132
48	25	30	56	120	100
54	28	35	60	110	144

6. Give products:

40×40	70×60	80×50	50×70
80×40	90×80	12×90	80×60
90×30	100×40	100×60	200×35
60×50	200×25	400×50	500×50
50×70	300×15	500×25	600×40

DRILL WORK

Multiply and test:

1. 8465	a 22	
2. 7645	b 45	
3. 8741	c 50	Form 100 problems by mul-
4. 9860	d 86	tiplying each multiplicand by
5. 8425	e 76	each multiplier, as:
6. 9654 by	f 98	1 a 22 × 8465 = ?
7. 7869	g 56	1 d 86 × 8465 = ?
8. 9765	h 69	6 e 76 × 9654 = ?
9. 4875	i 97	
10. 8420	j 89	

11. Divide 969 by 23.　　　　**12.** Divide 969 by 24.

$$42\tfrac{3}{23}$$
$$23\overline{)969}$$
$$\underline{92}$$
$$49$$
$$\underline{46}$$　　**Test.** — 42 × 23 = 966
$$3$$　　　　　966 + 3 = 969

$$40\tfrac{9}{24}$$
$$24\overline{)969}$$
$$\underline{96}$$
$$9$$

Divide and test:

13. 84765	a 86	
14. 57672	b 78	
15. 80720	c 91	Form 64 problems by
16. 50724	d 59	dividing each of the divi-
17. 60925 by	e 72	dends by each of the divi-
18. 86412	f 67	sors, thus:
19. 76412	g 82	13 a 84765 ÷ 86 = ?
20. 83456	h 65	13 c 84765 ÷ 91 = ?
		18 e 86412 ÷ 72 = ?

ADDITION AND SUBTRACTION OF HALVES AND FOURTHS
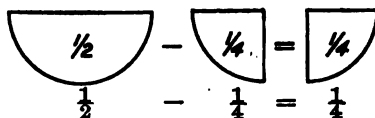
Halves   **Fourths**
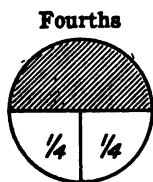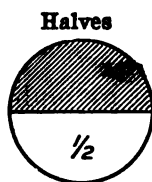
$\frac{2}{2}$ equal one whole unit;
$\frac{1}{2} + \frac{1}{2} = \frac{2}{2}$ or 1.

$\frac{4}{4}$ equal one whole unit;
$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{4}{4}$ or 1.

$$\frac{1}{2} \;=\; \frac{1}{4} \;+\; \frac{1}{4} \;=\; \frac{2}{4}$$

1. $\frac{1}{2} = \frac{?}{4}$; $\frac{1}{2} + \frac{1}{4} = \frac{?}{4}$; $\frac{1}{2} + \frac{1}{4} + \frac{1}{4} = \frac{?}{4}$.

$$\frac{1}{2} \;-\; \frac{1}{4} \;=\; \frac{1}{4}$$

2. $\frac{1}{2} - \frac{1}{4} = \frac{?}{4}$; $\frac{3}{4} - \frac{1}{2} = \frac{?}{4}$; $\frac{2}{4} - \frac{1}{2} = \frac{?}{4}$.

First add, then subtract:

3.	**4.**	**5.**	**6.**	**7.**
$5\frac{1}{2}$	$9\frac{3}{4}$	$9\frac{1}{2}$	$5\frac{1}{4}$	$8\frac{3}{4}$
$3\frac{1}{4}$	$8\frac{1}{2}$	$3\frac{1}{2}$	4	$2\frac{1}{2}$

Add:

8.	**9.**	**10.**	**11.**	**12.**
$3\frac{1}{2}$	$67\frac{1}{4}$	$65\frac{1}{2}$	$25\frac{3}{4}$	$56\frac{1}{4}$
$4\frac{1}{4}$	$6\frac{1}{2}$	$7\frac{3}{4}$	$8\frac{1}{4}$	$7\frac{1}{2}$
$7\frac{3}{4}$	$5\frac{1}{2}$	$9\frac{1}{4}$	$9\frac{3}{4}$	$8\frac{1}{4}$
$15\frac{1}{2}$				

In example 8, $\frac{3}{4} + \frac{1}{4} = \frac{4}{4}$ or 1; $1 + \frac{1}{2} = 1\frac{1}{2}$.   Write the fraction $\frac{1}{2}$ and add the 1 to the whole number.

HALVES, FOURTHS, AND EIGHTHS

Halves   Fourths   Eighths

$\frac{1}{2}$ = $\frac{2}{4}$ = $\frac{4}{8}$
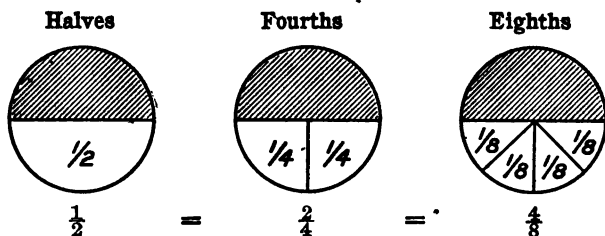
1. $\frac{1}{2} = \frac{?}{4} = \frac{?}{8}.$ $\frac{2}{8} + \frac{1}{2} + \frac{1}{4} = \frac{?}{8}.$ $\frac{4}{8} - \frac{1}{4} = \frac{?}{8}.$

2. Compare $\frac{1}{2}$ and $\frac{4}{4}$ of the same circle.

3. Compare $\frac{1}{2}$ and $\frac{1}{8}$ of the same circle.

4. $\frac{1}{4}$ is what part of $\frac{1}{2}$? $\frac{4}{8} = \frac{?}{2} = \frac{?}{4}.$

5. $\frac{1}{2} = \frac{?}{8}$; $\frac{1}{4} = \frac{?}{8}$; $\frac{1}{2} + \frac{1}{8} + \frac{1}{4} = \frac{?}{8}$; $\frac{1}{2} - \frac{1}{8} = \frac{?}{8}.$

6. Into how many eighths can the whole circle be divided? into how many fourths?

Add:

7.	8.	9.	10.	11.
$3\frac{1}{2}$	$7\frac{3}{4}$	$6\frac{1}{2}$	$9\frac{1}{8}$	$5\frac{1}{8}$
$3\frac{1}{8}$	$8\frac{1}{2}$	$7\frac{1}{4}$	11	$12\frac{1}{4}$
$4\frac{1}{4}$	$9\frac{1}{2}$	$9\frac{2}{8}$	$6\frac{1}{2}$	$3\frac{1}{2}$

12. $\frac{3}{4} + \frac{2}{4} + \frac{3}{4} = \frac{8}{4}$, or 2 whole units; $\frac{3}{8} + \frac{7}{8} + \frac{6}{8} =$ how many whole units?

Subtract, then add:

13.	14.	15.	16.	17.
$10\frac{3}{8}$	$12\frac{1}{2}$	$27\frac{3}{4}$	$19\frac{1}{4}$	$36\frac{1}{2}$
$5\frac{1}{4}$	$6\frac{1}{8}$	$8\frac{3}{8}$	$6\frac{1}{8}$	$16\frac{3}{8}$

18.	19.	20.	21.	22.
$62\frac{5}{8}$	$63\frac{3}{4}$	$26\frac{3}{4}$	$18\frac{3}{4}$	$40\frac{3}{4}$
$31\frac{3}{8}$	$39\frac{1}{2}$	$24\frac{3}{8}$	$9\frac{3}{8}$	$20\frac{1}{8}$

THIRDS, SIXTHS, AND NINTHS

Thirds	Sixths	Ninths

$$\frac{1}{3} \qquad = \qquad \frac{2}{6} \qquad = \qquad \frac{3}{9}$$

1. $\frac{1}{3} + \frac{3}{9} = \frac{?}{9}$; $\frac{1}{3} + \frac{1}{6} = \frac{?}{6}$.

2. $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{?}{3}$ or—unit ; $\frac{1}{3} + \frac{3}{9} = \frac{?}{9}$; $\frac{1}{2} = \frac{?}{6}$; $\frac{1}{2} + \frac{1}{6} = \frac{?}{6}$.
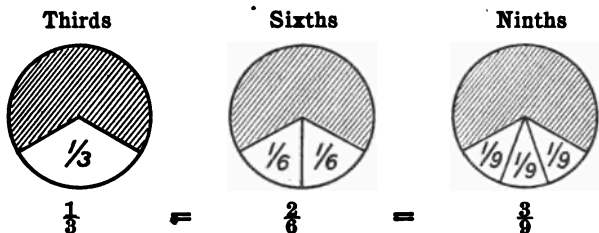
First add and then subtract :

3. $15\frac{2}{3}$ 4. $29\frac{1}{3}$ 5. $81\frac{1}{2}$ 6. $42\frac{8}{9}$
   $\underline{10\frac{2}{9}}$ $\underline{13\frac{1}{6}}$ $\underline{20\frac{1}{6}}$ $\underline{13\frac{1}{3}}$

7. $62\frac{5}{8}$ 8. $15\frac{5}{6}$ 9. $16\frac{7}{8}$ 10. $19\frac{2}{3}$
   $\underline{12\frac{1}{4}}$ $\underline{12\frac{2}{3}}$ $\underline{10\frac{1}{4}}$ $\underline{12\frac{1}{6}}$

11. Mrs. Clark bought $1\frac{5}{6}$ dozen lemons and used $1\frac{1}{3}$ dozen. How many remained ?

12. Henry studies $4\frac{1}{6}$ hours a day, and James $6\frac{1}{3}$ hours. How much longer does James study each day than Henry ?

13. A flower bed is $4\frac{1}{3}$ ft. long and $2\frac{2}{3}$ ft. wide. Find the distance around it.

14. If it takes Henry $3\frac{1}{3}$ hours to walk a certain distance, or $1\frac{1}{9}$ hours to ride it on his bicycle, how much time does he save by riding ?

MULTIPLICATION

1. Multiply 794 by 326.

```
    694                        694
    326                        326
   4164 =   6 × 694           4164
  13880 =  20 × 694           1388
 208200 = 300 × 694           2082
 226244 = 326 × 694         226244
```

When multiplying by 3 hundreds, write the partial product as 2082 *hundreds* by placing the first figure of that product under *hundreds*.

Multiply:

2. 462	**3.** 283	**4.** 619	**5.** 543
375	243	128	264

6. $40.75	**7.** $26.73	**8.** $38.27	**9.** $46.75
325	364	918	842

?0. 465 by 327	**17.** 5382 by 147	**24.** $46.75 by 275
11. 289 by 943	**18.** 2493 by 316	**25.** $83.94 by 843
12. 568 by 769	**19.** 9875 by 827	**26.** $76.15 by 972
13. 987 by 938	**20.** 7341 by 695	**27.** $39.85 by 867
14. 478 by 783	**21.** 9386 by 783	**28.** $48.57 by 984
15. 925 by 867	**22.** 6294 by 894	**29.** $96.78 by 786
16. 387 by 591	**23.** 9387 by 619	**30.** $39.74 by 815

31. Announce products at sight:

20 × 40	50 × 50	12 × 12	80 × 80

MULTIPLICATION

1. Multiply 273 by 304.

```
    273
    304
   ----
   1092
    000
    819
  ------
  82992
```

```
    273
    304
   ----
   1092
    819
  ------
  82992
```

Do not multiply by 0 as in the first illustration. When multiplying by 3 hundreds, write the partial product as 819 *hundreds* by placing the right hand figure of that product in *hundreds'* place.

2.
```
     402
   × 503
   -----
    1206
   2010
  ------
  202206
```

3.
```
  $30.60
  × 2040
  --------
  122400
  6120
  ---------
  $62424.00
```

4.
```
   $20.75
   × 105
   ------
   10375
   2075
  --------
  $2178.75
```

5. 316
× 502

6. 275
× 306

7. 428
× 405

8. 506
× 307

9. 243
× 308

10. 709
× 504

11. 608
× 209

12. 705
× 804

13. $8.08
× 607

14. $40.75
× 603

15. $90.70
× 504

16. $38.04
× 703

How many are:

1. 704×3096	6. 309×4039	11. $803 \times \$40.70$
2. 809×9409	7. 907×7008	12. $709 \times \$75.25$
3. 609×7320	8. 408×6007	13. $304 \times \$68.07$
4. 507×8060	9. 502×9103	14. $508 \times \$70.95$
5. 608×3724	10. 903×7030	15. $806 \times \$48.57$

Multiply:

16. 8945 by 643	26. 6785 by 904	36. 5078 by 206
17. 3089 by 136	27. 7856 by 685	37. 9067 by 508
18. 4506 by 275	28. 9786 by 607	38. 8906 by 379
19. 3875 by 609	29. 7869 by 783	39. 6709 by 806
20. 5783 by 382	30. 6778 by 579	40. 6076 by 927
21. 3296 by 907	31. 9868 by 632	41. 8405 by 403
22. 7395 by 834	32. 5846 by 597	42. 6035 by 876
23. 3837 by 958	33. 6484 by 460	43. 8708 by 804
24. 6574 by 687	34. 9676 by 329	44. 7083 by 705
25. 8936 by 706	35. 6798 by 376	45. 5067 by 770

46. Mr. Watson had 2475 boxes of soap. Each contained 175 cakes. Find the entire number of cakes.

47. A factory averages 2485 articles for 310 days of the year. What is the entire number made?

48. Mrs. Thompson raised 246 turkeys and sold them at $1.75 each. How much did she receive for them?

49. A suit factory manufactured 3685 suits during the season. At $28.50 each, how much was received for them?

PARTS OF NUMBERS

1. Find $\frac{2}{3}$ of 24.

$\frac{1}{3}$ of 24 is 8;

$\frac{2}{3}$ of $24 = 2 \times 8$, or 16.

How do we find $\frac{1}{3}$ of a num-ber? $\frac{1}{4}$ of a number? $\frac{1}{5}$ of a number, etc.? $\frac{2}{3}$ of a number $= 2 \times \frac{1}{3}$ of the number. $\frac{3}{5}$ of a number $= 3 \times \frac{1}{5}$ of the number, etc.

Give rapidly.

2. $\frac{1}{2}$ of each number: 16, 24, 36, 44, 48, 50.

3. $\frac{1}{3}$ and $\frac{2}{3}$ of each number: 15, 18, 24, 36, 45.

4. $\frac{1}{4}$ and $\frac{3}{4}$ of each number: 16, 20, 28, 32, 48.

5. $\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$, and $\frac{4}{5}$ of each number: 20, 35, 45, 40, 80.

Find:

6. $\frac{1}{3}$ of 18   **12.** $\frac{2}{3}$ of 18   **18.** $\frac{2}{3}$ of 21   **24.** $\frac{2}{3}$ of 75

7. $\frac{1}{3}$ of 24   **13.** $\frac{3}{4}$ of 28   **19.** $\frac{3}{4}$ of 20   **25.** $\frac{2}{5}$ of 75

8. $\frac{1}{2}$ of 16   **14.** $\frac{1}{7}$ of 56   **20.** $\frac{2}{5}$ of 40   **26.** $\frac{3}{4}$ of 96

9. $\frac{1}{2}$ of 42   **15.** $\frac{1}{8}$ of 64   **21.** $\frac{7}{8}$ of 24   **27.** $\frac{1}{2}$ of 144

10. $\frac{2}{3}$ of 24   **16.** $\frac{1}{9}$ of 63   **22.** $\frac{2}{5}$ of 65   **28.** $\frac{3}{5}$ of 160

11. $\frac{3}{5}$ of 25   **17.** $\frac{2}{3}$ of 63   **23.** $\frac{5}{6}$ of 48   **29.** $\frac{4}{5}$ of 255

Find:

30. $\frac{2}{3}$ of $24   **35.** $\frac{3}{4}$ of 12 lb.   **40.** $\frac{1}{2}$ of $8.20

31. $\frac{3}{4}$ of $16   **36.** $\frac{2}{3}$ of 9 ft.   **41.** $\frac{1}{3}$ of $12.60

32. $\frac{1}{2}$ of $50   **37.** $\frac{1}{3}$ of 12 yd.   **42.** $\frac{1}{4}$ of $20.40

33. $\frac{2}{3}$ of $18   **38.** $\frac{3}{4}$ of 16 gal.   **43.** $\frac{1}{3}$ of $15.90

34. $\frac{3}{4}$ of $20   **39.** $\frac{2}{4}$ of 8 bu.   **44.** $\frac{1}{4}$ of $24.20

MULTIPLICATION BY MIXED NUMBERS

1. Multiply 36 by $6\frac{2}{3}$.

36

$6\frac{2}{3}$

$24 = \frac{2}{3}$ of 36 $6\frac{2}{3} \times 36$, means that $\frac{2}{3}$ of 36 is to

$216 = 6 \times 36$ be added to 6×36.

$240 = 6\frac{2}{3} \times 36$

Multiply:

2.	72 by $8\frac{3}{4}$	**19.**	9764 by $876\frac{1}{2}$
3.	126 by $9\frac{2}{3}$	**20.**	9972 by $984\frac{2}{3}$
4.	324 by $12\frac{1}{2}$	**21.**	8848 by $787\frac{3}{4}$
5.	872 by $25\frac{3}{4}$	**22.**	7266 by $719\frac{2}{3}$
6.	966 by $124\frac{2}{3}$	**23.**	8755 by $394\frac{3}{5}$
7.	848 by $238\frac{3}{4}$	**24.**	9875 by $485\frac{2}{5}$
8.	489 by $372\frac{1}{2}$	**25.**	9672 by $872\frac{2}{3}$
9.	1248 by $309\frac{1}{4}$	**26.**	6488 by $797\frac{3}{4}$
10.	2530 by $842\frac{2}{5}$	**27.**	7465 by $864\frac{2}{5}$
11.	3575 by $909\frac{2}{5}$	**28.**	7280 by $620\frac{1}{4}$
12.	8496 by $890\frac{3}{4}$	**29.**	4860 by $701\frac{3}{4}$
13.	3660 by $780\frac{2}{3}$	**30.**	5050 by $500\frac{2}{5}$
14.	8575 by $197\frac{1}{5}$	**31.**	6006 by $303\frac{2}{3}$
15.	8496 by $875\frac{3}{4}$	**32.**	9608 by $490\frac{3}{4}$
16.	9639 by $976\frac{2}{3}$	**33.**	8570 by $809\frac{3}{5}$
17.	8472 by $865\frac{3}{4}$	**34.**	6099 by $789\frac{2}{3}$
18.	8436 by $345\frac{1}{4}$	**35.**	7085 by $804\frac{2}{5}$

FRACTIONAL PARTS OF A DOLLAR

$.50 = $\frac{1}{2}$ of $1.00	$.12$\frac{1}{2}$ = $\frac{1}{8}$ of $1.00
$.25 = $\frac{1}{4}$ of $1.00	$.06$\frac{1}{4}$ = $\frac{1}{16}$ of $1.00
$ 20 = $\frac{1}{5}$ of $1.00	$.33$\frac{1}{3}$ = $\frac{1}{3}$ of $1 00
$.10 = $\frac{1}{10}$ of $1.00	$.16$\frac{2}{3}$ = $\frac{1}{6}$ of $1.00
$.40 = $\frac{2}{5}$ of $1.00	$.75 = $\frac{3}{4}$ of $1.00

Give at sight the cost of:

1. 6 bushels of apples at $.50 a bushel.

   HINT. — $6 \times \$\frac{1}{2} = \$\frac{6}{2} = \$3$.

2. 8 gallons of vinegar at $.25 a gallon.

3. 8 yards of silk at $.50 a yard.

4. 8 pounds of meat at $.12$\frac{1}{2}$ a pound.

5. 10 dozen eggs at $.20 a dozen.

6. 9 yards of muslin at $.10 a yard.

7. 6 pecks of pears at $.25 a peck.

8. 12 pictures at $.75 each.

9. 10 yards of lawn at $.10 a yard.

10. 6 gallons of vinegar at $.50 a gallon.

11. 8 gallons of oil at $.25 a gallon.

12. 12 dozen oranges at $.25 a dozen.

13. 6 bushels of apples at $.50 a bushel.

14. 16 pounds of rice at $.12$\frac{1}{2}$ a pound.

15. 10 pecks of peaches at $.20 a peck.

16. 8 gallons of milk at $.12$\frac{1}{2}$ a gallon.

DIVISION

Give quotients at sight:

	a	b	c	d
1.	100 ÷ 10	280 ÷ 140	993 ÷ 331	315 ÷ 105
2.	500 ÷ 50	930 ÷ 310	645 ÷ 129	972 ÷ 324
3.	300 ÷ 30	860 ÷ 172	951 ÷ 317	725 ÷ 145
4.	250 ÷ 50	396 ÷ 132	284 ÷ 142	932 ÷ 466
5.	400 ÷ 80	960 ÷ 320	788 ÷ 197	260 ÷ 130
6.	844 ÷ 211	990 ÷ 330	882 ÷ 126	775 ÷ 155

7. Divide 175608 by 324.   8. Divide 793320 by 264.

$$\begin{array}{r} 542 \\ 324)\overline{175608} \\ 1620 \\ \hline 1360 \\ 1296 \\ \hline 648 \\ 648 \\ \hline \end{array}$$

$$\begin{array}{r} 3005 \\ 264)\overline{793320} \\ 792 \\ \hline 1320 \\ 1320 \\ \hline \end{array}$$

Since 264 is larger than 13, what do we write in the quotient?

Divide:

	a	b	c
9.	63596 by 126	46785 by 135	13940 by 340
10.	78563 by 341	78568 by 244	81282 by 408
11.	48842 by 144	65375 by 255	23674 by 726
12.	26786 by 354	78634 by 184	83765 by 415
13.	46785 by 165	79673 by 263	27854 by 129
14.	83761 by 219	86572 by 196	76348 by 366

DIVISION

1. Divide 7284 by 600.

$$6\emptyset\emptyset)\overline{7284}$$
$$12\tfrac{84}{600}$$

2. 9754 by 800.

$$8\emptyset\emptyset)\overline{9754}$$
$$12\tfrac{154}{800}.$$

3. Divide 48525 by 2300.

$$21\tfrac{225}{2300}$$
$$23\emptyset\emptyset)\overline{48525}$$
$$\underline{46}$$
$$\overline{25}$$
$$\underline{23}$$
$$\overline{225}\ \text{Rem.}$$

Cutting off the naughts in the divisor and 2 figures in the dividend divides both by 100, with a remainder of 25 in the dividend. 485 hundreds divided by 23 equals 21, with a remainder of 2 hundreds. Bring down the first remainder of 25 to form the complete remainder, 225.

Divide:

4. 76856 by 2200

5. 86040 by 3100

6. 86075 by 2500

7. 40673 by 3200

8. 87604 by 2300

9. 68025 by 4200

10. 56078 by 2400

11. 70642 by 4100

12. 47630 by 5100

13. 85763 by 1300

Find quotients:

14. $869325 \div 463$

15. $739186 \div 956$

16. $293869 \div 409$

17. $891382 \div 786$

18. $632007 \div 817$

19. $283756 \div 268$

20. $873700 \div 945$

21. $586138 \div 715$

22. $938004 \div 807$

23. $139287 \div 800$

PROBLEMS OF TWO OPERATIONS

1. A dairyman has 137 cows in one herd and 47 less in another. How many cows has he?

Study of Problem

137   No. cows in one herd.
 47   No. less in 2d herd.
————
 90   No. cows in 2d herd.

137 cows + 90 cows = 227 cows.

1. What is given in this problem?
   a. The number of cows in one herd.
   b. The difference in the number in the two herds.

2. What is required in the problem?
   a. The number in the second herd.
   b. The number in both herds.
3. How can you find what is required from what is given?
   a. By subtracting the difference from the number in the first herd.
   b. By adding the number of cows in the two herds.

NOTE. — The purpose of these studies is threefold:
1. To train the pupil to see and understand the conditions of the problem.
2. To give a logical grasp of the conditions of the problem.
3. To direct the teacher in his efforts to attain these ends.

2. A man has 267 sheep in one field and 88 less in another. How many sheep has he?

3. A merchant has $496 in the safe and $175.25 less in the bank. How much money has he in both places?

4. A man sold a farm for $7625 and gained $1685. How much would he have received for it if the gain had been $2675?

5. A man's salary is $950 per year. He pays $260 for board, $136 for clothing, and $115.75 for other expenses. How much has he left?

6. A grocer deposited in bank during the week the following sums: $495.65, $283.75, $693.29, $75.80, $249.89, and $375.77. After making the last deposit, he found there was a balance to his credit of $1265.15. How much had he withdrawn?

7. If a freight car costs $475, and a locomotive $14625, what is the value of a train containing 27 cars and a locomotive?

8. A woman sold at a store 16 doz. eggs at 18¢ a dozen, 13¼ lb. of butter at 28¢ a pound, and 27 lb. of dressed chicken at 16¢ a pound. How much did she receive for all?

9. A lady bought at a store:

> 8 lb. of coffee @ 28¢;
> 9½ lb. of rice @ 8¢;
> 24 lb. of sugar @ 5¢;
> 8 cans tomatoes @ 13¢;
> 20 cans beans @ 19¢.

Find the amount of her purchases.

10. Find the cost of:

> 27½ lb. of cheese @ 18¢;
> 14¾ lb. of lard @ 12¢;
> 17 lb. of butter @ 27¢;
> 25 bottles ammonia @ 8¢;
> 12 cans peas @ 18¢.

11. A man earned each day in one week as follows: $2.75, $3.65, $4.75, $6.75, $1.75, $12.75. Find his average daily earnings.

Study of Problem

```
$ 2.75
  3.65
  4.75
  6.75
  1.75
 12.75
6)$32.40  in 6 days.
  $5.40  average each day.
```

1. What is given in this problem?

2. What is required?

3. What is the first step in the solution? the second?

4. Why do you divide by 6 to find the average?

5. Show that the answer is correct.

12. Two men contribute equal amounts to buy a lot for $875; to build a storeroom for $4860; for furniture, $520; and for goods to begin business, $5785. How much does each pay?

13. A creamery received milk for six days as follows: 7640 gallons, 8675 gallons, 9634 gallons, 8432 gallons, 8763 gallons, and 8604 gallons. What were the average daily receipts?

14. If Helen received 85 in arithmetic, 79 in grammar, 89 in history, 92 in geography, 86 in physiology, and 85 in writing, what was her average in these studies?

15. The attendance at a school was 604 on Monday, 607 on Tuesday, 598 on Wednesday, 603 on Thursday, 598 on Friday. What was the average daily attendance for the week? ·

16. 39 ladies' suits, each requiring 12 yards, were made from a lot of cloth containing 576 yards. How many yards were left?

Study of Problem

12 yd. in 1 suit.

39 number of suits.

$\overline{108}$

36

$\overline{468}$ yd. in 39 suits.

576 yd. $- 468$ yd. $= 108$ yd.

1. State this problem in another way.

2. What operation is employed in the first step in the solution? in the second?

3. Prove that the answer is correct.

17. A boy sold 16 books at 20 cents each, and 36 toys at 26 cents each. How much more did he receive for the toys than for the books?

18. Mr. Boyd's mail route is $23\frac{1}{2}$ miles, and Mr. Burton's is $17\frac{1}{4}$ miles. How much farther does Mr. Boyd travel in 84 days than Mr. Burton?

19. A school term is 180 days. If James attends $\frac{4}{5}$ of the term, how many days is he absent from school?

20. A bookkeeper receives $150 a month, and saves $68 a month. How much does he spend in a year?

21. Harry works $48\frac{1}{2}$ hours after school each month, at 12 cents per hour, and Henry $52\frac{3}{4}$ hours at 16 cents per hour. Find the difference in their wages.

22. What is the difference between the cost of 17 horses at $156 each, and 69 cows at $37 each?

23. A merchant buys 28 bbl. of sugar at $23 a barrel, and 36 bbl. at $24 a barrel. If he sells all for $1856, how much does he gain?

24. A merchant paid $420.48 for carpet, and sold it for $569.40. If he gained 17¢ on each yard, how many yards did he buy?

Study of Problem

$569.40 selling price of all.

420.48 cost price of all.

$148.92 gain of all.

Gain on

1 yd. $.17)$148.92 gain on all.

876 times, or yd.

1. What do you mean by the term "cost"?

2. What do you mean by "selling price"? by "gain"?

3. How do you find the total gain?

4. Prove that the answer is correct.

25. I bought land for $1850, and sold it for $2294, thereby gaining $6 an acre. How many acres did I buy?

26. A drover bought cows for $1500, and sold them for $2250. If he gained $15 on each, how many did he buy?

27. Mr. Kinney paid $2640 for a city lot, and sold it for $4560. If he gained $24 a front foot, how many front feet did he sell?

28. The population of a town was 8675 in 1900, and 12635 by a special census taken in 1905. What was the average yearly increase?

29. Mr. Beggs paid $288 rent last year. This year he pays $36 less. What is his rent per month?

30. A jeweler bought rings for $140 and sold them for $160. If he gained $.50 on each, how many did he buy?

31. A laborer worked 16 days at $1.60 a day, and with his earnings bought potatoes at 64 ¢ a bushel. How many bushels did he receive?

Study of Problem

$1.60 daily wages.

   16 number of days worked.

  9 60

16 0

$25.60 total wages.

Price of   40 times, or bushels.

1 bu. $.64)$25.60 total wages.

1. State this problem in another way.

2. How can we find the total amount earned?

3. What operation is involved in the first step of the solution? in the second step?

4. Prove that the answer is correct.

32. If 124 bags of coffee, each weighing 48 lb., were bought for $729.12, what was the price per pound?

33. At 20 ¢ per hour how long will it take a laborer to earn $80, working 8 hours per day?

34. If 96 bu. of corn sell for $60.48, what is the value of 250 bushels at the same price?

35. A trackman averages 2 miles per hour for 8 hours each day. His record book shows 960 miles walked. Find the number of days.

36. If a dozen lemons cost $.36, how much will 840 lemons cost?

37. If 25 bbl. of flour weigh 4900 lb., how much will 56 bbl. weigh?

38. If 23 carriages cost $4025, how much are 84 such carriages worth?

39. If 600 bu. of shelled corn weigh 33,600 lb., how much will 468 bu. weigh?

40. When 9 bales of cotton, weighing 325 lb. each, sell for $731.25, what is the price per pound?

41. If a peach basket holds 2 pecks, how many bushels are there in 12 carloads, each containing 456 baskets?

42. How many books each 2 inches thick can be placed in a bookcase containing 4 shelves, each shelf of which is 3 ft. in length?

43. If 123 tons of coal cost $725.70, how much will 16 tons cost?

44. 24 cords of wood cost $90; how much will 18 cords cost at the same rate?

45. If a newsboy earns $19.98 in 18 days, how much will he earn at the same rate in 360 days?

46. When 525 gallons of milk sell for $84, for how much will 715 sell?

47. Mary bought 16 pounds of coffee at 14¢ a pound, 8 lb. of butter at 28¢ a pound, and 12 cans of corn at 15¢ a can. She gave the merchant in payment a $10 bill. How much change should she receive?

48. A drover sold 56 sheep at $4 each, 8 cows at $36 each, and 48 hogs at $12 each. If he received $275 on the day of the sale, how much is still due him?

49. A lady had $100. If she bought 4 chairs at $6 each, a couch for $28, and a rocking chair for $16, how much had she left?

50. I bought 57 yards of cloth at 25¢ a yard, and 16 yards of matting at 28¢ a yard. Find the cost of both.

51. A lady sold 6 doz. eggs at 18 cents a dozen, and 8 lb. of butter at 27 cents a pound. How much did she receive for both?

52. A merchant bought 546 bbl. of pork at $16.25 a barrel, and sold it so as to gain $1638. At what price per barrel did he sell the pork?

53. James earned $1.50 per day and saved 85 cents. If his savings were $33.15, how many days did he work?

54. A farmer bought 4 horses at $137 each, 7 cows at $27 each, and 38 sheep at $6.50 each. Find the cost of all.

55. What will be the cost of 108 lb. of ham at $16\frac{1}{2}$ cents a pound, and 48 lb. of breakfast bacon at 18 cents a pound?

56. Two automobile parties travel in opposite directions, one at an average of 127 miles, the other at 78 miles a day. How far apart will they be in 16 days?

57. A factory employs 56 men at $1.75 a day, and 12 men at $2.25 a day. Other expenses are $125 a day. How much does it cost to run the factory 26 days?

58. A man paid $165 for a carriage, and $3\frac{2}{5}$ times as much for a span of horses. How much did he pay for both?

59. Mr. Hall deposited in the bank $24 a month for 8 months, and $27 a month for 4 months. How much did he deposit in the year?

REVIEW OF DIVISION

Divide and test:

1. 84563 by 224
2. 45675 by 125
3. 46752 by 236
4. 84252 by 342
5. 78654 by 375
6. 98740 by 425
7. 97601 by 438
8. 98700 by 508
9. 80070 by 710
10. 81704 by 508
11. 99999 by 999
12. 50321 by 637

13. 95846 by 675
14. 37846 by 332
15. 92846 by 124
16. 45983 by 475
17. 32841 by 243
18. 92384 by 752
19. 66008 by 300
20. 15899 by 122
21. 77443 by 224
22. 59823 by 525
23. 78912 by 640
24. 93408 by 825

Find quotients and test:

25. $136425 \div 405$
26. $246840 \div 476$
27. $332468 \div 332$
28. $948562 \div 450$
29. $476352 \div 221$
30. $789324 \div 552$
31. $569239 \div 334$
32. $159909 \div 115$
33. $550550 \div 155$
34. $889034 \div 324$

35. $604325 \div 304$
36. $708546 \div 222$
37. $125745 \div 125$
38. $985432 \div 112$
39. $756342 \div 102$
40. $354725 \div 256$
41. $498075 \div 401$
42. $987260 \div 200$
43. $800745 \div 310$
44. $584972 \div 226$

COMBINING PROCESSES

1. $6 + 4 + 8 - 7 + 4 - 9 = ?$

2. $7 + 6 - 5 - 4 + 9 - 6 = ?$

The **parenthesis** ( ) indicates that all numbers inclosed by it are to be considered as one number; thus, $(7 + 9) - (4 + 5)$ means that the sum of 4 and 5 is to be taken from the sum of 7 and 9.

The **vinculum** (——) is sometimes used instead of the parenthesis; thus, $\overline{7 + 9} - \overline{4 + 5} = 7$.

Solve:

3. $9 + 8 - (6 + 6) + 7 - 3 = ?$

4. $8 + 6 + 16 - 7 - 8 + 6 = ?$

5. $26 + 38 - (48 - 23) + 16 = ?$

6. $87 - 42 + \overline{96 - 72} + 26 = ?$

7. $(97 - 35) - \overline{26 + 14} + 78 = ?$

8. $\overline{86 - 48} + 56 - 28 - 47 = ?$

COUNTING BY MIXED NUMBERS

1. Count by $2\frac{1}{2}$ to 40; by $3\frac{1}{3}$ to 40; by $6\frac{1}{4}$ to 50.

2. Announce at sight:

$1\frac{1}{2} \times 4$	$1\frac{1}{2} \times 6$	$1\frac{1}{3} \times 6$	$1\frac{1}{4} \times 4$
$2\frac{1}{2} \times 4$	$2\frac{1}{2} \times 6$	$2\frac{1}{3} \times 6$	$2\frac{1}{4} \times 4$
$3\frac{1}{2} \times 4$	$3\frac{1}{2} \times 6$	$3\frac{1}{3} \times 6$	$3\frac{1}{4} \times 4$
$4\frac{1}{2} \times 4$	$4\frac{1}{2} \times 6$	$4\frac{1}{3} \times 6$	$4\frac{1}{4} \times 4$

3. Build similar tables with $1\frac{2}{3}$, $1\frac{3}{4}$, and $1\frac{2}{5}$.

ANALYSIS

1. Find the cost of 3 doz. oranges at 20 ¢ per dozen.

1 doz. oranges cost 20 ¢; 3 doz. cost 3 times 20 ¢ = 60 ¢.

2. At 12 cents a quart for berries, how much will 8 quarts cost?

3. At 30 ¢ a peck, how much will a bushel of beans cost?

4. When peaches are 50 cents a basket, how much will 7 baskets cost?

5. A ton of coal costs $5. How much will 9 tons cost?

6. A boy rides his wheel 6 miles in one hour. How far will he ride in 7 hours?

7. When 5 boxes of matches cost 50 ¢, how much will 1 box cost?

> Cost of 5 boxes = 50 ¢;
> Cost of 1 box = $\frac{1}{5}$ of 50 ¢, or 10 ¢.

8. A boy bought 4 balls for 80 cents. How much was that apiece?

9. When 8 yards of velvet cost $24, how much will 1 yard cost?

10. A box of shoes containing 12 pairs costs $36. Find the cost per pair.

11. Six cows were sold for $246. What was the average selling price?

12. When a telegram of 10 words costs 40 cents, what is the average cost of each word?

ANALYSIS

1. When 1 pencil costs 10 ¢, how many can you buy for 60 ¢?

When 1 pencil costs 10 ¢, for 60 ¢ you can buy as many pencils as 10 ¢ is contained in 60 ¢.

2. At 12 ¢ per yard, how many yards of ribbon can be bought for 96 ¢?

3. Cherries are 8 ¢ a quart. How many quarts can be bought for 72 ¢?

4. When 3 tons of coal cost $18, how much will 7 tons cost?   Cost of 3 tons = $18;
Cost of 1 ton = $\frac{1}{3}$ of $18, or $6;
Cost of 7 tons = 7 × $6, or $42.

5. How much will 9 dozen lemons cost when 3 dozen sell for 45 cents?

6. Three men earn $30 in a certain time. How much will 8 men earn in the same time?

7. When $\frac{1}{2}$ a bushel of potatoes sells for 25 cents, how much will 3 bushels cost?

Cost of $\frac{1}{2}$ bu. = 25 ¢;
Cost of 1 bu. = 2 × 25 ¢, or 50 ¢;
Cost of 3 bu. = 3 × 50 ¢, or $1.50.

8. At 20 cents a peck, how much will 2 bushels of apples cost?

9. When milk is selling at 5 ¢ a quart, how much will 3 gallons cost?

10. If $\frac{1}{4}$ of a yard of velvet costs 60 ¢, how much will 2 yards cost?

COMPARISON

1. Compare 80 and 20 ; 60 and 30 ; 90 and 10.

2. $2\frac{1}{2}$ is what part of 5 ? of 10 ? of 15 ? of 20 ?

3. $3\frac{1}{3}$ is what part of 10 ? of 20? of 30? of $6\frac{2}{3}$?

4. Compare $\frac{9}{10}$ and $\frac{3}{10}$; $\frac{8}{10}$ and $\frac{4}{10}$; $\frac{10}{10}$ and $\frac{5}{10}$.

5. What part of 25 is 5 ? ·is $6\frac{1}{4}$? is $2\frac{1}{2}$? is $8\frac{1}{3}$?

6. What part of 6 pk. is 2 pk.? of 10 gal. is 2 gal.?

7. 3 pk. is what part of $1\frac{1}{2}$ bu. ? of $2\frac{1}{4}$ bu. ?

8. 8 oz. of butter is what part of 2 lb. ? of $2\frac{1}{2}$ lb. ?

9. When $2\frac{1}{4}$ pounds of butter cost 90 cents, how much will 9 pounds cost ?

9 pounds equal $4 \times 2\frac{1}{4}$ pounds; hence, 9 pounds will cost 4×90 cents, or $3.60.

10. If $\frac{1}{2}$ a ton of hay costs $7.50, how much will 4 tons cost?

11. When 2 pecks of potatoes cost 50 cents, how much will $1\frac{1}{2}$ bushels cost ?

12. When butter is selling at 3 pounds for $\frac{1}{2}$, how much will 15 pounds cost ?

13. When $2\frac{1}{2}$ dozen buttons sell for 30 cents, how much will $7\frac{1}{2}$ dozen cost ?

14. If $6\frac{1}{4}$ tons of coal cost $37.50, how much will 25 tons cost ?

15. If $7\frac{1}{2}$ yards of velvet cost $11.40, how much will 15 yards cost ? How many yards can be bought for $22.80 ?

16. A boy picked 18 quarts of chestnuts and sold them at the rate of 2 quarts for 25 cents. How much did he receive for them ?

17. If 3 pounds of steak cost 48 cents, how much will 10 pounds cost?

18. A farmer raised 40 bushels of shelled corn per acre on $7\frac{1}{2}$ acres. At the same rate, how many bushels would he raise from $22\frac{1}{2}$ acres?

Find the cost of :

19. 288 chairs, when 9 chairs cost $6.75.

20. 350 rings, when 7 rings cost $19.74.

21. 285 fans, when 5 fans cost $1.75.

22. 144 knives, when 6 knives cost $5.04.

23. 78 vases, when 6 vases cost $17.76.

24. 248 hats, when 8 hats cost $15.68.

25. 24 pictures, when 4 pictures cost $18.92.

26. 48 lamps, when 16 lamps cost $34.56.

27. 54 clocks, when 27 clocks cost $72.63.

28. 28 desks, when 14 desks cost $173.32.

29. 78 rockers, when 26 rockers cost $196.30.

30. 36 watches, when 18 watches cost $702.

31. 36 cords of wood, when 6 cords cost $35.04.

32. 128 tons of coal, when 8 tons cost $57.60.

33. 180 quarts of milk, when 18 quarts cost $1.08.

34. 56 crates of melons, when 8 crates cost $28.80.

35. 328 books, when 8 books cost $1.44.

BILLS

PITTSBURG, PA., *Dec. 1*, 1907.

Mr. *L. M. Thomas,*

     57 Pearl St.

    Bought of C. H. MORRISON & CO.,

TERMS: *Cash.*   1854 PENN AVENUE.

2 bu. apples,	@ *$ 0.75*	*1*	*50*		
3 doz. eggs,	@ *.25*		*75*		
2 bbl. flour,	@ *6.50*	*13*	*00*		
	Total,			*15*	*25*

Observe that this bill shows: (1) the *place* and the date; (2) who *bought* the goods; (3) who *sold* the goods; (4) the *name of the goods* sold and the *price* and the *amount* of each sale.

The abbreviation @ for "at" should always be used in making out a bill.

To **foot** a bill means to add the cost of all the separate articles.

The word **total** means the amount of the sales.

Make bills of the following sales, using a schoolmate's name as purchaser, and your grocer as the one who sells the goods.

     1.   2 lb. butter, @ 25¢

         6 lb. meat,   @ 15¢

         3 bars soap, @ 10¢

Make out bills as suggested on previous page.

2. 3 skeins yarn, @ $0.08
   4 papers needles, @   .05
   5 yd. ribbon, @   .50

3. 5 bu. potatoes, @ $0.75
   3 boxes peaches, @   1.50
  12 doz. lemons, @   .40

4. 4 spools thread, @ $0.05
   6 papers pins, @   .10
   5 cards hooks and eyes, @ .02

5. 5 lb. roast beef, @ $0.15
   3 lb. pork chops, @   .15
   4 lb. lamb chops, @   .18

6. 7 silver forks, @ $2.00
   3 sterling spoons, @   1.75
   4 napkin rings, @   3.25

7. 4 nickel sponge racks, @ $2.25
   5 hairbrushes, @   2.00
   6 nickel towel rods, @   .75

8. 4 doz. linen writing paper, @ $0.20
   4 doz. linen envelopes, @ .15
  12 stamps, @   .02

9. 12 pkgs. flax seed, @ $0.05
   3 oz. cologne, @   .10
   5 lb. paint, @   .20

10. 2 music cabinets, @ $15.00
   5 rocking chairs, @   5.00
   3 medicine cabinets, @ 3.00

REVIEW OF MEASURES

1. Give the table used for measuring liquids.

2. Name some articles sold by liquid measure.

3. Give the table used for measuring dry and bulky articles.

4. Name the most common articles sold by the peck or the bushel.

5. Give the table of measures of weight.

6. Name the most common articles sold by the ounce; the pound ; the ton.

7. Give the table used for measuring time.

8. Give the table of measures of length.   What measures are used for measuring short distances ? long distances ?

9. Give the table of measures of surface.

10. Write the names of the measures on blackboard or paper, and write each of the following under its proper measure : oil, cheese, oats, hay, beans, potatoes, coal, cloth, molasses, sugar, rice, the surface of the blackboard, the width of the room, the length of the blackboard.

11. Draw a diagram to show the number of square inches in an oblong 4 in. by 3 in.

12. Show by diagram that 9 square feet equal one square yard.

13. Show by a diagram on a scale of $\frac{1}{12}$ inch to the foot that 144 square inches equal one square foot.

MEASURES

Change:

1. 16 pt. to gallons.		**8.** 74 pk. to bushels.
2. 24 bu. to pecks.		**9.** 3750 yd. to feet.
3. 3 sq. ft. to sq. inches.		**10.** 3 in. to feet.
4. 17 yd. to feet.		**11.** 6 mi. to rods.
5. 120 ft. to inches.		**12.** 360 ft. to yards.
6. 50 lb. to ounces.		**13.** 4860 in. to feet.
7. 6 T. to pounds.		**14.** 6966 sq. ft. to sq. yd.

15. How many dozen oranges, and how many over are there in a box containing 143 oranges? 165 oranges? 195 oranges?

16. Find the number of square inches in a flower bed 4 feet long and 3 feet wide.

17. The slate blackboard is 3 feet wide and 26 feet long. Find its surface in square feet.

18. A fruit dealer buys chestnuts at $3 per bushel, and sells them at $.10 per quart. Find his profit.

19. The schoolroom floor is 36 feet long and 28 feet wide. Find the number of square feet in the floor; in the ceiling.

20. James walks to school every morning, 600 yards. How many feet does he walk each day, in going to and coming from school?

21. A huckster sells 10 bushel-crates of peaches at 20 cents per quarter peck. Find the amount from the sale of the peaches.

PRACTICAL WORK

240 ft.

	A	B	C	D	E	F	
	30ft.	40ft.	40ft.	40ft.	40ft.	50ft.	

Sidewalk 10ft.
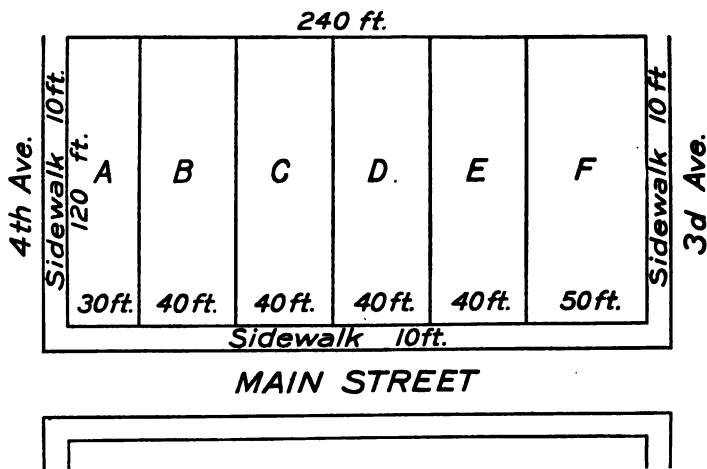
MAIN STREET

1. Mr. Stokes, a real estate agent, purchased this plan of lots at $70 per front foot on Main Street. Find the cost of the plan of lots.

2. Mr. R. M. Holland purchased lot A at $110 per front foot, and built on it a house for $6450. Find the cost of Mr. Holland's property.

3. Mr. Remington purchased lots B and C for $8000. He put an iron fence around his lots at $1.10 per foot. Find the cost of the fence.

4. The concrete sidewalk on Main St. is 10 ft. in width. Find the cost of Mr. Remington's walk at 19¢ per square foot.

5. Mr. Stokes sells lots D, E, and F to L. F. Holtzman for $9500. Find his profits on these lots.

TEST PROBLEMS

Find the cost of 1, when:

1. 8 yards of cloth cost $9.28.
2. 4 barrels of flour cost $30.
3. 12 kegs of nails cost $37.80.
4. 10 pounds of sugar cost $.50.
5. 5 weeks' wages are $22.50.
6. 8 pounds of butter cost $3.20.
7. 9 gallons of milk cost $2.16.
8. 2 bushels of peanuts cost $6.40.
9. 6 yards of cloth cost $5.04.
10. 8 pounds of dates cost $1.20.
11. 3 tons of hay cost $42.
12. 6 pairs of shoes cost $15.90.
13. 3 crates of berries cost $9.30.
14. 12 dozen eggs cost $3.60.

15. What is the amount of a five-dollar bill, a two-dollar bill, a half-dollar, 3 quarters, 2 dimes, a nickel, and 2 cents?

16. How much change will be given in taking $8.60 from a ten-dollar bill?

17. Find the sum of 5 five-dollar bills, a two-dollar bill, 5 quarters, 4 dimes, and 3 nickels.

18. How many minutes are there in $2\frac{1}{2}$ hours?

19. Write in Roman numerals the numbers from 100 to 150.

20. How many inches of twine will measure 3 times around an 8-inch square?

21. $\frac{1}{5}$ of my money is $7. How much have I?

22. Thomas bought a horse for $165, and sold it at a loss of $18. How much did he get for it?

23. How much will 1 bushel of apples cost if $\frac{1}{2}$ peck costs 30 cents?

24. A man paid $37.50 for a bicycle for his daughter. After 9 months it was sold for $28.25. How much less was the selling price than the cost?

25. Mr. Wills bought a horse for $174. He kept it for 3 months, and then sold it for $18.50 less than it cost. How much did he receive for the horse?

26. How much does a butcher gain on 100 lb. of meat bought at 12¢ and sold at 15¢ per pound?

27. Coal is bought at $5.50 a ton and sold at $6.75 a ton. How much is gained on 50 tons?

28. At 3 for 5¢, how much will 2 doz. lemons cost?

29. A farmer raised 354 bushels of oats and sold $\frac{1}{6}$ of it. How many bushels did he sell? How many had he left?

30. How much will 3 pecks of cranberries cost at 8 cents a quart?

31. Find the perimeter of a room 14 ft. long and 12 ft. wide.

32. How many hours are there in September, October, November, and December?

Add these examples in two minutes:

33.	34.	35.	36.
$25.36	$163.75	$243.15	$121.48
43.72	275.84	65.74	83.62
96.81	486.39	182.33	275.14
39.47	928.75	34.62	8.73
62.58	265.73	215.73	16.28
21.47	734.22	34.07	179.82

Write and subtract in three minutes:

37. $425.31 − $268.75.   **42.** $213.24 − $ 78.67.

38. $268.74 − $149.83.   **43.** $672.38 − $249.97.

39. $395.89 − $206.90.   **44.** $315.44 − $158.65.

40. $485.71 − $179.89.   **45.** $463.07 − $269.18.

41. $192.39 − $ 86.93.   **46.** $280.05 − $163.78.

47. Tell what you understand by each of the following: Sum, −, Quotient, Plus, Minuend, Product, Addition, ×, Divisor, Multiplier, Remainder, =, Addends, Units, pt., Roman numerals, Dividend, +, Subtrahend, Multiplicand, Hundreds, ÷, Tens, bu., qt., ¢, Difference, ft., gal., yd., yr., mo., Subtraction, @.

48. Miss Pratt bought a Kodak for $20, a tripod for $3.50, a roller for 75 cents, films for $2.75, and a carrying case for $1.75. How much did she spend for the outfit?

49. A street-car conductor collected 50 five-cent fares on the down trip and 63 five-cent fares on the return trip. What was the amount collected?

50. Make change : Name the pieces in each instance.

Purchase	$ 7.85	Payment	$10.
"	$ 5.67	"	$ 7.
"	$ 1.57	"	$ 5.
"	$ .67	"	$ 2.
"	$ .32	"	$ ½.
"	$13.71	"	$20.
"	$ 7.35	"	$10.
"	$34.73	"	$40.

51. There are 1489 children of school age in a borough; the number enrolled in school is 896. How many are not enrolled ?

52. How many days are there in May, June, July, and August? how many hours?

53. The Federal Constitution was adopted in 1787. How long ago was that ?

54. Massachusetts was settled in 1620. How old was the colony in 1776?

55. How much must be added to $285.48 to make $650 ?

56. Mr. Tate earns $1850 a year. He spends $454 for food, $127 for clothing, $240 for rent, and $376 for other expenses. How much does he save ?

57. A man buys a lot for $675. If he pays in three payments $138, $225, and $175, how much does he still owe ?

58. An automobile cost $1800. After paying $42 for repairs it was sold for $1520. Find the loss.

59. In one year my coal cost me $26.25 in addition to $4.25 for wheeling it into my cellar. The next year it cost $34.75 and $5.47 for wheeling. Find the difference in cost for the two years.

60. I paid $2875 for my house, and $1267 less for my barn. Find the cost of both.

61. A merchant had in cash $685.75. He received from sales during the day $416.86, and paid out $156.80. What was his cash balance at the close of the day?

62. A lady spent $1.75 for gloves, $1.44 for calico, $.19 for needles, and $.56 for lace. How much change did she get from a $10 bill?

63. A ship sails 4825 miles in 25 days. What is her average daily rate of speed?

64. The President's salary is $50,000 a year. How much is that a month? a day?

65. How many days are there in 1632 hours?

66. There are 36 inches in a yard. How many yards are there in 2412 inches?

67. During one month I paid $26.74 for groceries, $12.25 for meat, $4.64 for milk, $2.75 for gas, and $2.28 for light. How much did I pay for all?

68. Mr. Wilt pays $1.75 a month for fuel, $2.85 for light, and $1.25 for water. How much do the three cost him in a year?

69. A merchant deposits in the bank on six successive days, $475, $688, $1365, $2475, $866, and $3684. Find the amount of his deposits.

TICKETS	Price	Tues.	Wed.	Thurs.	Fri.	Total Receipts
Children	15¢	864	1865	1226	1285	
Adults	25¢	2864	3245	2764	3768	
One-horse vehicles	35¢	376	364	176	472	
Two-horse vehicles	50¢	212	216	144	224	

70. Find total admissions of each class, and the receipts in money from each in the 4 days.

71. Find the receipts in money each day.

72. Add daily receipts; add total receipts for each class.

73. A dealer pays $312.50 for 25 children's bicycles. How much is that apiece?

74. A merchant pays $17.28 for 4 dozen boys' caps. Find the cost of each cap.

75. At $84 per dozen, how much does a jeweler pay for 15 watches?

76. A concrete walk, 80 ft. long and 4 ft. wide, costs $57.60. How much is that a square foot?

77. A ranchman clipped $4\frac{2}{3}$ pounds of wool on an average from each of 2175 sheep. How much is it worth at 40¢ per pound?

78. John's books weigh $2\frac{3}{4}$ lb., and he weighs $58\frac{1}{2}$ lb.; how much does he weigh with the books in his hand?

79. There are 1232 pupils in a school, and $\frac{5}{8}$ are girls. Find the number of girls in school; the number of boys.

80. Make out a bill for the following sales:

10 lb. cheese @ 11¢   12 lb. meat @ 12½¢
20 lb. sugar @ 5½¢   2 sacks flour @ $1.35

81. The Irving Public School had 360 pupils present on Monday, 365 on Tuesday, 350 Wednesday, 380 Thursday, and 375 Friday. What was the average daily attendance for the week?

82. Find the perimeter of your schoolroom.

83. Find the number of square yards in a playground 50 yards long and 30 yards wide.

84. Make a diagram ½ inch to 1 foot to show a rectangle 12 ft. long and 8 ft. wide. Find its area in square yards.

85. Explain how we find the number of square inches, square feet, or square yards in any rectangular surface.

86. A milk dealer pays $.15 a gallon for his milk, and retails it at 8¢ a quart. How much does he gain on 1 gallon? How much does he gain on 25 gallons?

87. A load of hay weighs 3700 lb. The wagon weighs 1200 lb. What is the value of the hay at $16 a ton?

88. Mr. Winter's tax is $310. He pays $90 on one property, $42.50 on another, and the balance on his home. Find the tax on his home.

89. A man has $500 left after spending $300 of his salary for rent, $225 for food and clothing, $75 for other expenses. Find his yearly salary.

90. A fruit dealer bought 3 baskets of plums for $1.80. How much would 6 baskets cost at the same rate? 21 baskets?

91. The daily expenses of a salesman for one week were as follows: Mon., $1.45; Tues., $1.25; Wed., $2.20; Thurs., $0.75; Fri., $1.55; Sat., $3.35. If he earned $18.75, how much had he left?

92. How many working days are there from Monday morning, Sept. 4, to Sunday, Nov. 19?

93. A clerk earns $24 a week, and spends $8. In how many weeks can he save enough to buy a suit at $45 and a hat at $3?

94. Each side of a box is 6 inches. How many square inches of paper will be needed to cover it?

95. How many 5ϕ pads can I buy for $1.35?

96. I bought a ham weighing 13 lb. at 13ϕ a pound, and a 5-lb. pail of lard at 15ϕ a pound, and gave $5 in payment. How much change should I receive?

97. When a 20-lb. cheese is worth $2.20, how much will a 10-lb. cheese cost at the same rate?

98. A merchant sold in one day 3 dozen hats at 3\frac{1}{4}$ each. Find the receipts from the sale of the hats.

99. How much does a huckster receive for 3 bbl. of apples 2$\frac{1}{2}$ bu. each, which he retails at 12 ϕ a half peck?

100. Mr. Lykens employs in his store 24 men at $2.25 a day, and 48 women at $1.25 a day. His other expenses are $90 a day. How much does it cost him to operate his store for 1 day?

101. St. Clair School uses 379 pads of paper in one school month. How many pads will it use in two terms of 9 months each?

102. In 2 months James saves $48.36, and his brother saves $27.49. How much can they both save in 4 months?

103. Find the cost of 247 pk. of berries at 6¢ per quart.

104. A box of soap costs $4.75. A druggist buys 2 boxes a month. How much does he pay for soap in 3 months?

105. Mr. Brown sets aside $100 for his vacation. He spends $42.50 for traveling, $28 for board, and $14.60 for sundries. How much has he left?

106. Mary bought sugar for 15¢, soap for 10¢, potatoes for 24¢, coffee for 35¢, berries for 25¢, and meat for 18¢. How much change should she receive from a two-dollar bill?

107. At 8¢ a qt., find the cost of $7\frac{1}{2}$ gal. of milk.

108. If a man earns $100 each month, and pays $22 for rent, and $36 for living expenses, how much money does he save each month?

109. How much does a merchant receive for 4 kegs of nails, each keg containing 100 lb., sold at $4\frac{1}{2}$¢ per lb.?

110. A wholesale dealer bought 67 bbl. of apples for $175, 85 bbl. of flour for $169, 34 bbl. of potatoes for $125. How many barrels did he get, and how much did he pay for them?

111. A student buys a dictionary for $15, paying 50¢ down, and the balance in weekly installments of 25¢. How many weeks will it take to cancel the debt?

112. James picked 4 bu. 3 pk. of berries, and sold them at 8¢ a quart. How much did he receive?

113. A lamp in a lighthouse consumes 2 gallons 1 quart of oil daily. Find the cost of the oil for September, October, and November, at 18¢ per gallon.

114. Make out the bill for the following: 3 pk. of potatoes at 20¢ a peck, 12 lb. of sugar at 7¢ a pound, 5 qt. of molasses at 15¢ a quart, 2 lb. of cheese at 25¢ a pound. How much change should be received from $5?

115. A dealer buys three paintings at auction for $544. If he sells one for $250, another for $275, and the third for $375, how much does he gain?

116. Find the cost of 2 bushels 2 pecks of nuts at 15 cents a peck.

117. In one season a pear orchard of 384 trees averaged 1¾ bu. of pears to the tree. Find their value at $1.25 a bushel.

118. How much do I gain on a box of fine soap costing $1.80 and containing a dozen cakes, if I sell the soap at 20¢ a cake?

119. A building lot 144 feet long, is ¼ as wide. How wide is it? How many square feet does it contain?

120. Find the cost of 3 bu. of cherries at 6¢ a quart.

REVIEW

Divide and test:

a	b	c
1. 16434 by 64	28792 by 270	33467 by 890
2. 34643 by 28	75639 by 770	77304 by 860
3. 19603 by 83	66041 by 602	44384 by 280
4. 94432 by 62	77006 by 784	35690 by 761
5. 26341 by 74	60424 by 603	88762 by 892
6. 36236 by 37	90328 by 735	56044 by 883
7. 42624 by 41	76028 by 344	76428 by 444
8. 76342 by 36	84605 by 766	23688 by 985
9. 64283 by 24	16248 by 860	55624 by 666
10. 55022 by 82	74637 by 450	34632 by 555
11. 44302 by 74	68026 by 360	99240 by 461
12. 16792 by 81	84132 by 770	36002 by 880
13. 28644 by 73	70066 by 880	45676 by 390
14. 74305 by 37	50468 by 480	76324 by 302
15. 83265 by 87	66399 by 790	25321 by 440
16. 78325 by 75	24166 by 670	65436 by 784
17. 85679 by 41	12345 by 154	70504 by 621
18. 39410 by 52	67890 by 221	62131 by 905
19. 80624 by 63	89765 by 336	88776 by 860
20. 73102 by 74	43210 by 742	54340 by 408
21. 81103 by 85	34786 by 819	82107 by 329
22. 77777 by 96	57602 by 745	62434 by 752
23. 88888 by 72	80703 by 613	93785 by 607

24. A real estate agent bought a field of 20 acres for $2000. He sold 8 acres at $125 an acre, and the rest at $90 an acre. How much did he gain?

25. My gas bill averages $3¼ per month, and my telephone bill $3½ per month. Find the yearly cost of both.

26. At 9 palings to the yard how many palings are required to fence an oblong garden 20 yards long and 15 yards wide?

27. A man living in Chester does business in Philadelphia, which is 13½ miles distant. How many miles does he travel in going and returning every week of 6 days?

28. In the morning he takes a train leaving at 7:34 and arriving at 8:05; in the evening a train leaving at 5:37 and arriving at 6:10. How many hours and minutes does he travel on the train during the week?

29. A lady buys 2 pieces of ribbon for $1.50, paying 5 cents per yard. There are 8 yards in one piece. How many yards are there in the other?

30. I bought a horse for $250, and sold it at a gain of ⅕ of the cost. At what price did I sell it?

31. How much is received for a barrel of potatoes containing 2½ bushels, if it is retailed at 10¢ a half peck?

32. A workman, who earns $2¼ a day, is injured by an accident and loses 8 days' work. How much money does he lose?

33. Find the cost of 6 dozen oranges at the rate of 4 oranges for 12 cents.

34. There are 30 passengers seated and 13 standing in a car, in which the conductor has collected $4.15 in 5¢ fares. How many people have left the car?

35. An oblong field is 80 rods long and 25 rods wide. How many rods of fence will it take to inclose it?

36. How many square yards are there in a room 18 feet long and 15 feet wide?

37. Find the perimeter of the room in Ex. 36 in yards; in feet; in inches.

38. A newsboy buys *Leaders* at the rate of 5 for 3¢, and *News* at the rate of 7 for 10¢. How much does he gain on the sale of 65 *Leaders* at 1¢ each, and 35 *News* at 2¢ each?

39. Find the perimeter in feet, and the area in square inches of an oblong 26 inches long and 18 inches wide.

40. By selling a horse for $260, I lost $35. How much should I have gained by selling it for $310?

41. A lady bought 4 pairs of kid gloves at $1.50 a pair, 18½ yd. of cambric at 15¢ a yard, 8 yd. of muslin at 12½¢ a yard, and ½ dozen linen napkins at $4 a dozen. Find the cost of all.

42. The population of the United States increased from 9,633,822 in 1820, to 84,907,156 in 1906. Find the increase in this time.

43. A boy earns $1.25 each working day, and his expenses are $4.25 a week. Find his profits in 4 weeks.

FRACTIONS — ADDITION AND SUBTRACTION

(Review pages 190, 191, 192.)

Fifths	**Tenths**	**Fifteenths**
$1 = \frac{5}{5}$	$1 = \frac{10}{10}$	$1 = \frac{15}{15}$

$$\frac{1}{5} \qquad = \qquad \frac{2}{10} \qquad = \qquad \frac{3}{15}$$
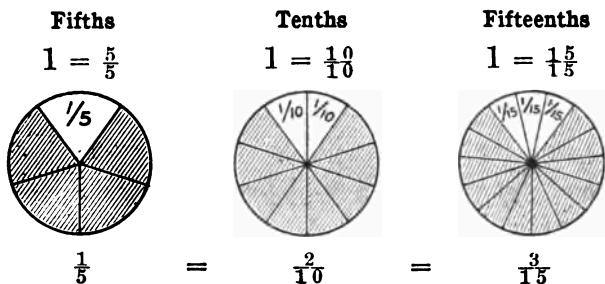
1. Draw circles and divide them as indicated. Draw circles of the same size and show that $\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$.

2. Draw circles and oblongs to show that $\frac{1}{3} = \frac{2}{6} = \frac{3}{9}$.

3. Divide oranges or apples to show these relations.

By a single thing we mean 1¢, 1 day, 1 hour, etc.

4. Show that any single thing may be divided into halves, thirds, fourths, fifths, sixths, sevenths, etc.

One or more of the equal parts of a single thing is called a **fraction**.

5. $\frac{1}{5} + \frac{3}{10} = \frac{?}{10}$; $\frac{1}{5} + \frac{4}{15} = \frac{?}{15}$; $\frac{5}{15} = \frac{?}{3}$; $\frac{2}{3} = \frac{?}{15}$.

First add, then subtract:

6. $4\frac{1}{5}$	**7.** $7\frac{2}{3}$	**8.** $7\frac{2}{3}$	**9.** $15\frac{7}{15}$	**10.** $7\frac{11}{15}$	**11.** $10\frac{9}{10}$
$3\frac{1}{10}$	$6\frac{1}{9}$	$5\frac{2}{9}$	$10\frac{1}{5}$	$5\frac{3}{5}$	$5\frac{2}{5}$

12. $\frac{9}{10} + \frac{1}{5} = \frac{?}{10} = -$ ones and $\frac{?}{10}$ over. $\frac{11}{10} = 1$ and $\frac{1}{10}$.

Halves	Sixths	Twelfths
$1 = \frac{2}{2}$	$1 = \frac{6}{6}$	$1 = \frac{12}{12}$

$\frac{1}{2}$ = $\frac{3}{6}$ = $\frac{6}{12}$

1. $\frac{1}{2} = \frac{?}{12}$; $\frac{6}{12} = \frac{?}{2}$; $\frac{2}{6} = \frac{?}{3}$; $\frac{2}{3} = \frac{?}{6}$; $\frac{4}{6} + \frac{5}{6} + \frac{3}{6} = $ —ones.
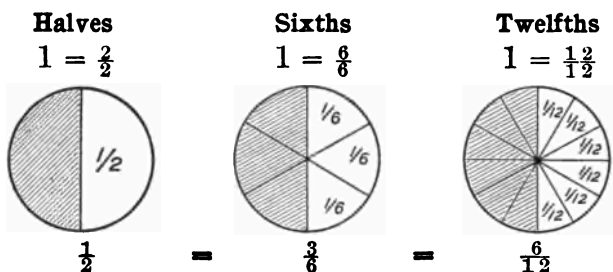
2. $\frac{2}{3}$ of a circle equals $\frac{?}{12}$ of the same circle.

Draw circles or oblongs to show these relations.

3. Which is larger, $\frac{2}{3}$ of an apple or $\frac{5}{6}$ of the same apple? $\frac{3}{4}$ of a dollar or $\frac{4}{5}$ of a dollar.

4. $\frac{1}{2} = \frac{?}{12}$; $\frac{2}{3} = \frac{?}{12}$; $\frac{3}{4} = \frac{?}{12}$; $\frac{5}{6} = \frac{?}{12}$; $\frac{24}{12} = $ — ones.

In the fraction $\frac{3}{4}$, the *four* shows into how many parts some single thing has been divided, and the *three* shows how many parts are taken.

The number in a fraction that tells the number of parts taken is called the **numerator**.

The number in a fraction that shows the number of parts into which some single thing has been divided is called the **denominator**.

5. Name the numerators, then the denominators, in the following fractions :

$\frac{1}{2}$; $\frac{2}{3}$; $\frac{1}{4}$; $\frac{3}{5}$; $\frac{7}{8}$; $\frac{9}{10}$; $\frac{11}{12}$; $\frac{3}{4}$; $\frac{5}{8}$; $\frac{5}{9}$; $\frac{7}{16}$; $1\frac{7}{12}$.

To change a fraction into ones and parts of ones, divide the numerator by the denominator.

6. $\frac{8}{4} = $ — ones ; $\frac{12}{6} = $ —ones ; $\frac{13}{6} = 2\frac{?}{6}$; $\frac{9}{6} = 1\frac{?}{6}$.

1. Add $\frac{1}{2}$ and $\frac{3}{8}$.

$$\frac{1}{2} = \frac{4}{8}$$
$$\frac{3}{8} = \frac{3}{8}$$
$$\frac{1}{2} + \frac{3}{8} = \frac{7}{8}$$

2. Add $\frac{1}{3}$ and $\frac{3}{4}$.

$$\frac{1}{3} = \frac{4}{12}$$
$$\frac{3}{4} = \frac{9}{12}$$
$$\frac{1}{3} + \frac{3}{4} = \frac{13}{12}, \text{ or } 1\frac{1}{12}$$

3. From $12\frac{3}{8}$ take $9\frac{1}{4}$.

$$12\frac{3}{8} = 12\frac{3}{8}$$
$$9\frac{1}{4} = 9\frac{2}{8}$$
$$12\frac{3}{8} - 9\frac{1}{4} = 3\frac{1}{8} \text{ difference.}$$

First add, then subtract :

4. $19\frac{5}{12}$ **6.** $12\frac{11}{12}$ **8.** $16\frac{11}{15}$ **10.** $15\frac{4}{5}$ **12.** $12\frac{2}{3}$

    $6\frac{1}{4}$ $6\frac{5}{6}$ $5\frac{2}{3}$ $10\frac{2}{3}$ $10\frac{2}{5}$

5. $11\frac{9}{10}$ **7.** $6\frac{8}{9}$ **9.** $41\frac{2}{3}$ **11.** $16\frac{1}{3}$ **13.** $15\frac{7}{12}$

    $4\frac{2}{5}$ $5\frac{2}{3}$ $16\frac{1}{4}$ $12\frac{1}{3}$ $5\frac{1}{2}$

Add :

14. $\frac{1}{3} + \frac{3}{4}$.   **16.** $\frac{3}{4} + \frac{2}{3}$.   **18.** $\frac{3}{5} + \frac{2}{3}$.   **20.** $\frac{7}{12} + \frac{3}{4}$.

15. $\frac{1}{2} + \frac{1}{4}$.   **17.** $\frac{3}{8} + \frac{3}{4}$.   **19.** $\frac{7}{8} + \frac{1}{2}$.   **21.** $1\frac{1}{2} + 3\frac{1}{4}$.

22. James worked $3\frac{3}{4}$ hr. on Saturday and $1\frac{2}{3}$ hr. on Monday. How many more hours did he work on Saturday than on Monday ?

23. Frank's marks for the month average $91\frac{5}{6}$, and John's average $89\frac{3}{4}$. Find the difference in their averages.

Halves	Eighths	Sixteenths
$1 = \frac{2}{2}$	$1 = \frac{8}{8}$	$1 = \frac{16}{16}$
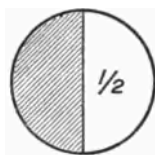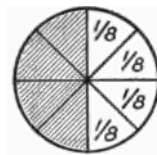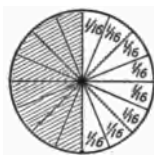
$$\frac{1}{2} \quad = \quad \frac{4}{8} \quad = \quad \frac{8}{16}$$

1. Draw circles as here shown, divided as indicated.

2. Compare in size the first fraction with the second:
$\frac{1}{4}$ and $\frac{2}{8}$; $\frac{1}{4}$ and $\frac{8}{16}$; $\frac{1}{2}$ and $\frac{6}{12}$; $\frac{1}{3}$ and $\frac{6}{9}$; $\frac{1}{4}$ and $\frac{9}{12}$.

3. Draw circles and show that $\frac{1}{2} = \frac{5}{10} = \frac{10}{20}$.

4. $\frac{3}{4} = \frac{?}{16}$; $\frac{3}{4} = \frac{?}{20}$; $\frac{2}{3} = \frac{?}{12}$; $\frac{4}{16} = \frac{?}{4}$; $\frac{9}{12} = \frac{?}{4}$.

5. Change to fractions, having the smallest possible number in both numerator and denominator:

$\frac{6}{12}$; $\frac{7}{10}$; $\frac{6}{8}$; $\frac{5}{12}$; $\frac{9}{12}$; $\frac{10}{15}$; $\frac{9}{16}$; $\frac{15}{20}$; $\frac{10}{20}$; $\frac{1}{8}$; $\frac{4}{5}$.

6. Draw circles or oblongs and show that $\frac{1}{2} = \frac{3}{6} = \frac{9}{18}$.

7. Change to ones and parts of ones:

$\frac{8}{4}$; $\frac{7}{5}$; $\frac{5}{4}$; $\frac{10}{5}$; $\frac{20}{4}$; $\frac{16}{4}$; $\frac{12}{6}$; $\frac{9}{8}$; $\frac{12}{9}$; $\frac{13}{4}$; $\frac{18}{6}$; $\frac{18}{8}$.

First add, then subtract:

8. $10\frac{9}{20}$	**10.** $15\frac{7}{18}$	**12.** $16\frac{5}{18}$	**14.** $5\frac{3}{4}$	**16.** $7\frac{3}{8}$
$6\frac{1}{5}$	$4\frac{1}{3}$	$4\frac{1}{6}$	$2\frac{3}{16}$	$4\frac{3}{16}$

9. $19\frac{9}{10}$	**11.** $8\frac{11}{16}$	**13.** $15\frac{2}{3}$	**15.** $45\frac{4}{5}$	**17.** $84\frac{2}{3}$
$4\frac{1}{2}$	$5\frac{1}{4}$	$10\frac{1}{8}$	$6\frac{9}{20}$	$14\frac{5}{18}$

Add:

1. $11\frac{1}{8}$
  $5\frac{1}{8}$
  $2\frac{1}{2}$

4. $3\frac{1}{4}$
  $2\frac{5}{6}$
  $12\frac{1}{4}$

7. $29\frac{1}{2}$
  $6\frac{1}{4}$
  $18\frac{1}{2}$

10. $97\frac{3}{8}$
  $\frac{2}{4}$
  $\frac{1}{8}$

13. $10\frac{5}{6}$
  $\frac{1}{3}$
  $4\frac{1}{6}$

2. $6\frac{2}{3}$
  $4\frac{1}{2}$
  $2\frac{1}{2}$

5. $11\frac{1}{3}$
  $5\frac{5}{6}$
  $3\frac{1}{3}$

8. $17\frac{3}{4}$
  $5\frac{5}{6}$
  $4\frac{1}{4}$

11. $8\frac{1}{8}$
  $3\frac{3}{4}$
  $\frac{1}{16}$

14. $80\frac{9}{20}$
  $4\frac{4}{5}$
  $70\frac{1}{20}$

3. $6\frac{1}{2}$
  $12\frac{3}{4}$
  $2\frac{1}{2}$

6. $40\frac{1}{4}$
  $16\frac{1}{2}$
  $5\frac{1}{6}$

9. $90\frac{1}{6}$
  $2\frac{1}{3}$
  $7\frac{3}{6}$

12. $7\frac{1}{2}$
  $4\frac{9}{10}$
  $2\frac{1}{2}$

15. $24\frac{1}{3}$
  $5\frac{2}{9}$
  $3\frac{7}{9}$

Subtract:

16. $25\frac{2}{3}$
  $17\frac{1}{2}$

21. $87\frac{3}{5}$
  $14\frac{1}{2}$

26. $80\frac{17}{20}$
  $16\frac{3}{4}$

31. $57\frac{11}{12}$
  $16\frac{3}{4}$

17. $16\frac{7}{12}$
  $4\frac{1}{2}$

22. $25\frac{1}{4}$
  $16\frac{1}{16}$

27. $45\frac{4}{5}$
  $16\frac{1}{2}$

32. $14\frac{3}{5}$
  $10\frac{1}{2}$

18. $19\frac{3}{4}$
  $16\frac{1}{6}$

23. $37\frac{7}{8}$
  $16\frac{3}{4}$

28. $17\frac{3}{4}$
  $16\frac{2}{3}$

33. $13\frac{8}{9}$
  $4\frac{2}{3}$

19. $8\frac{7}{9}$
  $5\frac{2}{3}$

24. $15\frac{9}{10}$
  $13\frac{4}{5}$

29. $49\frac{3}{4}$
  20

34. $6\frac{1}{3}$
  $4\frac{1}{4}$

20. $13\frac{9}{10}$
  $10\frac{2}{5}$

25. $20\frac{2}{3}$
  $16\frac{1}{2}$

30. $16\frac{7}{8}$
  $12\frac{3}{4}$

35. $27\frac{5}{8}$
  $1\frac{1}{2}$

36. $3\frac{1}{2}+2\frac{1}{4}=?$ $3\frac{1}{4}+2\frac{2}{3}-\frac{1}{2}=?$ $3\frac{1}{2}+2\frac{3}{8}-\frac{1}{4}=?$

1. The floor of a room is $13\frac{5}{8}$ ft. long and $12\frac{1}{3}$ ft. wide. Find the distance around the room. How much longer is the room than it is wide?

2. Mary's hair ribbon is $15\frac{3}{8}$ in. long and $1\frac{3}{4}$ in. wide. Find the difference between the length and the width of the ribbon.

3. James worked after school $1\frac{1}{3}$ hr. Monday, $1\frac{1}{2}$ hr. Tuesday, $1\frac{3}{4}$ hr. Wednesday, 2 hr. Thursday, and $1\frac{5}{6}$ hr. Friday. On Saturday he worked $10\frac{2}{3}$ hr. How many hours did he work during the week?

4. Morgan lives $1\frac{2}{3}$ mi. from school, and Frank $1\frac{3}{5}$ mi. in the same direction. In going to school, Morgan walks how much farther than Frank? Find the distance both walk in going to, and coming from school in a day.

Find fractional parts:

|			
5. $\frac{2}{3}$ of $48.	**9.** $\frac{8}{15}$ of 1260 yd.	**13.** $\frac{5}{12}$ of 360 da.
6. $\frac{3}{4}$ of $92.	**10.** $1\frac{1}{2}$ of $9600.	**14.** $\frac{4}{5}$ of $6.25.
7. $\frac{7}{8}$ of $80.	**11.** $\frac{8}{9}$ of $189.	**15.** $1\frac{1}{5}$ of $3.45.
8. $\frac{3}{5}$ of 550 rd.	**12.** $\frac{7}{8}$ of $984.	**16.** $\frac{5}{8}$ of $7.44.

17. There are 2136 pupils on the school roll. If $\frac{11}{12}$ were there Monday, how many were absent?

18. A gardener sold 2032 qt. of berries in one summer. He received 8¢ per quart for $\frac{7}{8}$ of the berries, and 5 ¢ per quart for the balance. For how much did he sell the berries?

This block or solid is 1 in.
long, 1 in. wide, and 1 in.
high.

It has six equal sides
called *faces*, and each face
contains **1 square inch.**

A block or solid with 6
equal square faces is called a
cube.
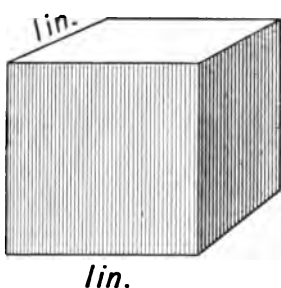
A cube whose faces are each a square inch contains a
cubic inch, written cu. in.

To the Teacher. — Secure 50 1-in. cubical blocks. Have pupils
build solids, and count the number of cubic inches in each solid;
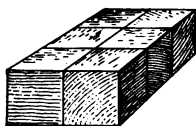the number of square inches on each face.

Fig. 1.

1. Build figure 1 with inch cubes.
How many cubes does it take?

2. Build figure 2 with inch cubes.
How many layers of blocks are there?
How many in each layer?

In 1 layer there are 6 cu. in.
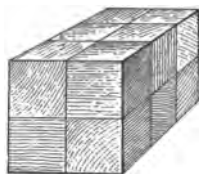
In 2 layers there are 2×6 cu. in. $=$
12 cu. in.

Fig. 2.

The number of cubic inches or cubic
feet in a solid is called the **volume** or
contents of the solid.

3. Build 12 blocks into a solid that
has 4 blocks in each layer. How many layers are there?

4. Build figure 3 with inch cubes. How many does it take? How many layers? How many are there in each layer? 3×6 cu. in. = 18 cu. in. in the solid.
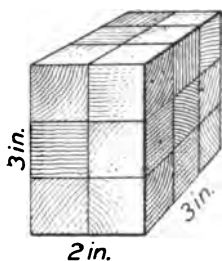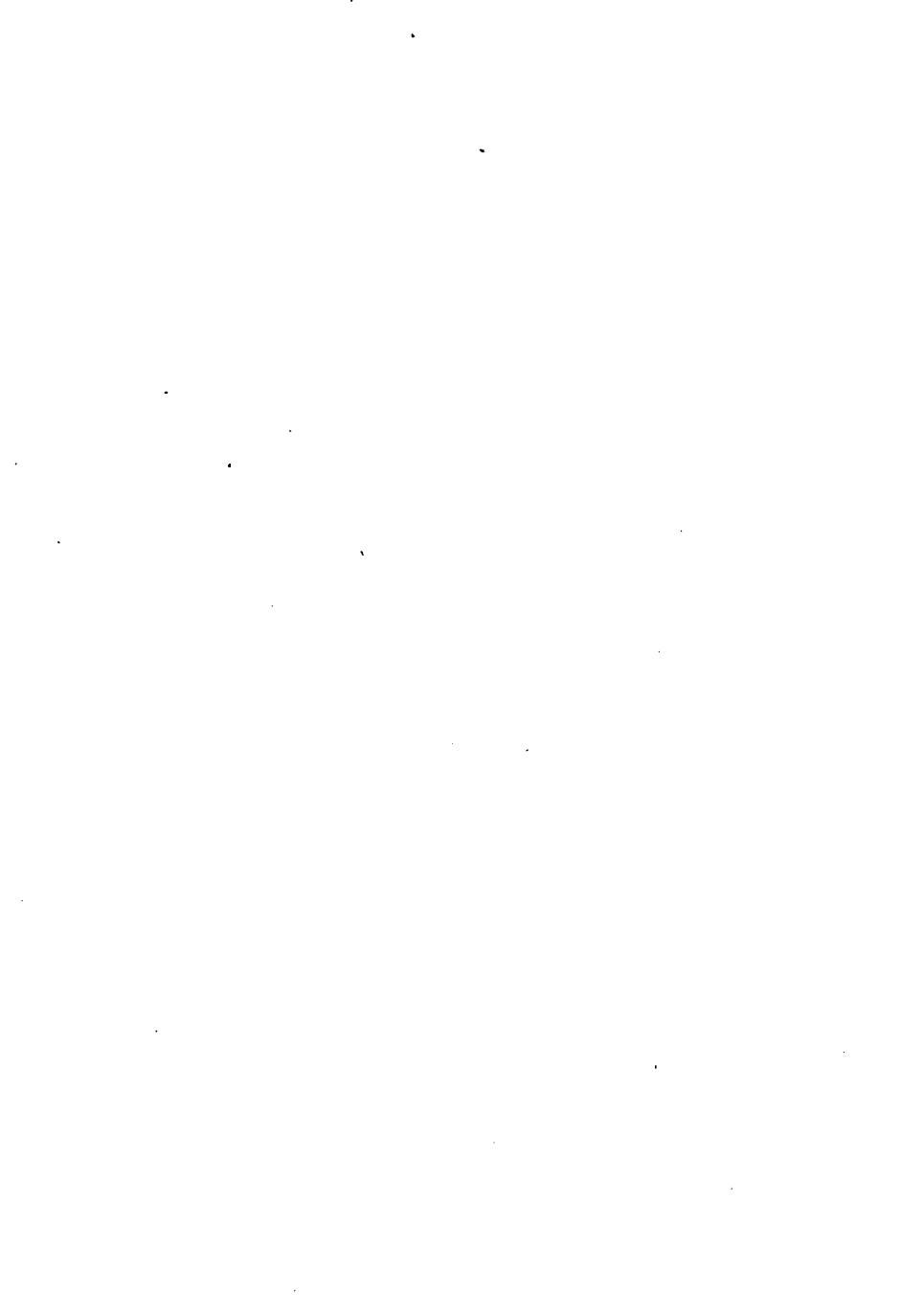

3 in.

2 in.

FIG. 3.

5. Build 10 other solids with blocks, and ascertain the number of blocks in each.

6. A brick is 8 in. long, 4 in. wide, and 2 in. thick. Find its volume in cubic inches.

7. A piece of wood is 3 in. wide, 3 in. thick, and 4 in. long. How many cubic inches does it contain?

8. A boy's book is 4 in. wide, 1 in. thick, and 6 in. long. Find the number of cubic inches in the book.

9. Mrs. Adams has a flower box that is 24 in. long, 8 in. wide, and 6 in. deep, inside measurement. How many cubic inches of soil will it take to fill it?

10. A square stick is 3 in. wide, 3 in. thick, and 12 in. long. How many cubic inches are there in the stick?

11. The inside of a box is 5 in. long, 4 in. wide, and 3 in. high. How many inch cubes can be built into it?

12. A box is 10 in. long, 6 in. wide, and 5 in. high, inside measurement. How many cubic inches of sand will it contain?